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Final Report

DICAMBA (SRR)
Task 2: Residue Chemistry

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DICAMBA

SECOND ROUND REVIEW

RESIDUE CHEMISTRY

Task - 2

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DICAMBA

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INTRODUCTION

Dicamba (3,6-dichloro-o-anisic acid) is a herbicide registered for use on asparagus, barley, corn, pasture and rangeland grasses, small grains grown for pasture, proso millet, oats, sorghum, soybeans, sugarcane, and wheat.

Registered for use on food and feed crops are the 5.9 and 11.8% granular (G), the 11.8% pelletted/tableted (P/T), and the 2 lb/gal emulsifiable concentrate (EC) formulations of dicamba acid (029801), the 0.32% G, the 10.15% EC, and 0.918, 1, 1.25, and 4 lb/gal soluble concentrate/liquid (SC/L) formulations of the dimethylamine salt (029802), the 2 lb/gal SC/L formulation of the sodium salt (029806), the 3 lb/gal SC/L formulation of the isopropylamine salt (128944), the 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt also known as the diglycolamine salt (128931), the 4 lb/gal SC/L and the 1.1 lb/gal flowable concentrate (Fl/C) formulations of the potassium salt (no Shaughnessy number available), and the 49.9% WP formulation of the aluminum salt (no Shaughnessy number available).

Tolerances for residues in or on food and feed plant commodities (excluding soybeans, soybean forage, and soybean hay) are expressed in terms of the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid (40 CFR 180.227[a]). Tolerances for residues in or on soybeans, soybean forage, and soybean hay and in animal products are expressed in terms of the combined residues of dicamba and its metabolite 3,6-dichloro-2-hydroxybenzoic acid (40 CFR 180.227[b]).

Dicamba was the subject of a Guidance Document issued September 30, 1983. The Guidance Document required additional data on storage stability; grain, milling fractions, forage, and fodder of sorghum; and poultry and eggs.

Revisions have been proposed to increase the levels of existing tolerances for the combined residues of dicamba and 3,6-dichloro-5-hydroxy-o-anisic acid in or on barley grain (1 ppm), barley straw (8.5 ppm), corn fodder (300 ppm), corn forage (300 ppm), corn grain (2 ppm), grass forage (700 ppm), grass hay (600 ppm), wheat grain (1 ppm), and wheat straw (8.5 ppm). Tolerances have been proposed for the combined residues of dicamba and 3,6-dichloro-5-hydroxy-o-anisic acid in or on cottonseed meal (6 ppm), palm oil (0.05 ppm), tomato catsup (0.6 ppm), tomato juice (0.6 ppm), wet tomato pomace (0.6 ppm), dry tomato pomace (0.6

ppm), and tomato puree (0.6 ppm). Tolerances have been proposed for the combined residues of dicamba and 3,6-dichloro-2-hydroxybenzoic acid in or on cottonseed (3 and 4 ppm) and in cottonseed meal (5 and 8 ppm).

Sandoz Crop Protection Corp. has proposed that the tolerances listed in 40 CFR 180.227(a) and (b) be expressed in terms of residues "resulting from the application of one or more of the salts of dicamba including dimethylamine, sodium, diglycolamine, isopropylamine, potassium, and/or the application of dicamba in acid form..." (letter from J.S. Fickle, Sandoz Crop Protection Corporation, to J. Yowell, [PM-25], EPA dated November 19, 1987 located in the Amended Use File for dicamba). The Agency responded favorably to the proposal (memorandum by K. Dockter dated December 8, 1987 located in the amended use file for dicamba), although it was concluded that only 40 CFR 180.227(a) be amended since there are no direct uses of dicamba on animals (we note that 40 CFR 180.227[b] contains tolerance listings for soybean commodities as well as animal commodities).

QUALITATIVE NATURE OF THE RESIDUE IN PLANTS

Conclusions:

The Dicamba Guidance Document dated 9/30/83 concluded that the qualitative nature of the residue in plants is adequately understood. No additional data were required. However, it is noted that if additional registrations on food or feed crops other than grains, grasses, or legumes are sought, additional plant metabolism data may be required.

[^{14}C]Dicamba is rapidly absorbed and translocated by grasses (MRID 00022753), grapes (MRID 00022745), black valentine beans (MRID 00079708), wheat and bluegrass (MRID 00036921), and soybeans (MRID 00102945). Dicamba is also rapidly absorbed by sugarcane following foliar application but is very slowly translocated from the leaves to the roots (MRID 00079747).

The chemical structures of dicamba and its metabolites in plants and animals are illustrated in Table 1. Dicamba is metabolized in plants chiefly by demethylation and hydroxylation. The major components of the terminal residue in grains and grasses are dicamba (I), 5-hydroxydicamba (II) and conjugates of these compounds. The major metabolite in the terminal residue of asparagus and soybean is DCHBA (III).

The current tolerance definitions are appropriate for all commodities except asparagus; the available data (MRID 00025344) indicate that asparagus should be listed under 40 CFR 180.227(b), since the predominant terminal residue is DCHBA (III) and 5-

hydroxydicamba was not found. In cereal grains, grasses, and sugarcane, dicamba is hydroxylated to the 5-hydroxy metabolite (II). Asparagus, soybeans, cotton, and ruminants convert dicamba to DCHBA (III). In sugarcane, 5-hydroxy dicamba (II) may be demethylated to 3,6-dichlorogentisic acid (IV), which also occurs in soybeans and cotton by hydroxylation of DCHBA (III). Evidence exists in ruminants for decarboxylation of DCHBA to produce 2,5-dichlorophenol (V).

Conjugation of residues in sugarcane appears to be limited to glucosides of 5-hydroxy dicamba (II) and 3,6-dichlorogentisic acid (IV) (MRID 00079747). There is evidence from residue data for conjugation of dicamba residues in the foliage of corn and soybeans. Addition of an acid hydrolysis step to analytical method AM-0691 increased the extraction of dicamba from corn silage and soybean stalks 14-28% over that of the unmodified method (refer to DEB Memorandum by M.P. Firestone dated 9/25/84 and located in the correspondence file for PP#3F2794 for discussion of these data); a modification of method AM-0691 submitted as AM-0691A and B includes heating the initial extract with 1 N hydrochloric acid at 95 C for 1.5 hours (refer to "Residue Analytical Methods" section for conclusions regarding methodology). In contrast, extraction of dicamba residues from cotton forage increased only 3% following hydrolysis and extraction of asparagus that had been treated with [^{14}C]dicamba using method AM-0268A, which does not include a hydrolysis step, released 90% of ^{14}C-residues (MRID 00025344). Addition of enzymatic or acid hydrolysis to AM-0268A failed to increase the levels of residues detected in field-treated asparagus harvested 1-315 days posttreatment (MRID 00026242).

References (used):

MRID(s): 00022745. 00022753. 00025344. 00036921. 00079708. 00079747. 00102945. 00118473.

References (not used):

[The following references contain summary or duplicate data.]

MRID(s): 00022747. 00022748. 00023110. 00028410. 00092485. 00092486. 00092487. 00092489. 00145248.

[The following references were either irrelevant or otherwise not useful in evaluating the qualitative nature of the residue in plants.]

MRID(s): 00004723. 00022744. 00022754. 00024737. 00025314. 00028366.

Discussion of the data:

N/A.

Table 1. Dicamba and its metabolites in plants and animals.

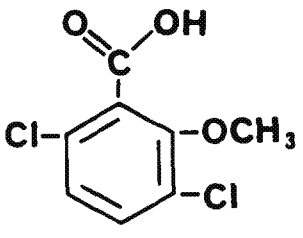
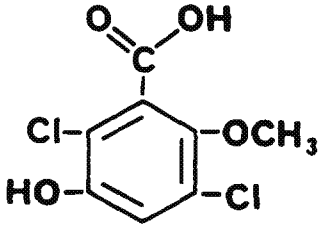
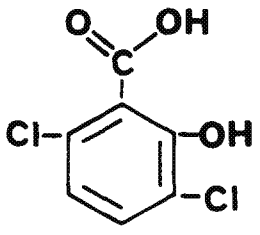
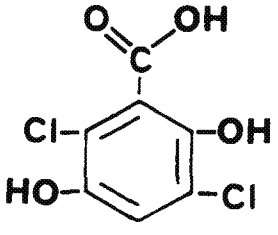
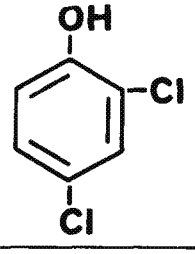
Code	Chemical name Structure	Substrate	MRID Common name
I	3,6-Dichloro-2-methoxybenzoic acid		
		Asparagus	00025344
		Sugarcane	00079747
		Soybean	00102945
		Wheat	00036921
		Bluegrass	00036921
		Cotton	00145248
		Poultry kidney	00145248
		Poultry excreta	00145248
		Cow tissues	00077779
			**Dicamba**
II	5-Hydroxy-3,6-dichloro-2-methoxybenzoic acid		
		Sugarcane	00079747
		Wheat	00036921
		Soybean	00102945
		Bluegrass	00036921
			**5-hydroxydicamba**

Table 1. Dicamba and its metabolites (continued).

Code	Chemical name Structure	Substrate	MRID Common name
III	3,6-Dichloro-2-hydroxybenzoic acid		
		Asparagus	00025344
		Sugarcane	00079747
		Soybean	00102945
		Bluegrass	00036921
		Wheat	00036921
		Cotton	00145248
		Poultry excreta	00145248
		Cow milk, tissues	00077779
			DCHBA; DSCA
IV	3,6-Dichloro-2,5-dihydroxybenzoic acid		
		Sugarcane	00079747
		Soybean	00102945
		Cotton	00145248
			3,6-Dichlorogentisic acid
V	2,5-dichlorophenol		
		Cow urine	00077779

QUALITATIVE NATURE OF THE RESIDUE IN ANIMALS

Conclusions:

The Dicamba Guidance Document dated 9/30/83 concluded that the nature of the residue in animals is adequately understood based on a single dairy cow metabolism study available as a published submission from the Velsicol Chemical Corporation (MRID 00077779). A poultry metabolism study submitted in 1984 by Velsicol (MRID 00145248) was reviewed in an Agency Memorandum (R.B. Perfetti, 8/14/84; PP#4F3041 and FAP#4H5428) and found adequate to describe metabolism of dicamba in poultry kidney and excreta. These data do not adequately explain the qualitative nature of the residue in animals because: (i) metabolites were identified and quantified only in poultry kidney and excreta and in ruminant liver and milk; (ii) ^{14}C-residues in eggs were not reported; (iii) ^{14}C-residues were not characterized in fat, kidney, and muscle from ruminants; and (v) laying hens received only a single dose and the lactating dairy cow received 11 consecutive doses of [^{14}C]dicamba. Furthermore, certification of access to raw data presented in MRID 00077779 was not provided. The following additional data are required:

- Metabolism studies utilizing ruminants and poultry. Animals must be dosed orally for a minimum of 3 days with ring-labeled [^{14}C]dicamba at a level sufficient to make residue identification and quantification possible. Milk and eggs must be collected twice a day during the dosing period. Animals must be sacrificed within 24 hours of the fina. dose. The distribution and identity of residues must be determined in milk, eggs, liver, kidney (expect poultry), muscle, and fat. Representative samples from the required metabolism studies must also be analyzed using a suitable confirmatory method such as MS or HPLC. Samples from these studies must also be analyzed using suitable enforcement methods to ascertain that the methods are capable of adequately recovering and identifying all residues of toxicological concern. Data depicting the nature of dicamba residues in swine may also be required if studies with ruminants and poultry reveal that the metabolism of dicamba in these animals differs from that in rats.

The chemical structures of dicamba and its metabolites in plants and animals are illustrated in Table 1. The ruminant metabolism study indicates that dicamba consumed in the diet is rapidly excreted by a lactating cow. The major component identified in urine was unaltered dicamba (I). The major metabolite in urine, feces, and tissues was demethylated dicamba, DCHBA (III) and dicamba was the only metabolite detected in milk. Urine also

contained minor amounts of a glucuronide conjugate of DCHBA and 2,5-dichlorophenol (V)

In the laying hen study, ca. 90% of a single dose of [^{14}C]dicamba was excreted within 96 hours of ingestion. The major component of the radioactive residue in excreta was the parent compound (I) with minor amounts of DCHBA (III). The only identified residue in the kidney was unaltered dicamba (I).

References (used):

MRID(s): 00077779. 00145248.

References (not used):

[The following references were not useful in evaluating the qualitative nature of the residue in animals.]

MRID(s): 00023106. 00128087.

Discussion of the data:

N/A.

RESIDUE ANALYTICAL METHODS

Conclusions:

No additional data regarding analytical methodology were required in the Dicamba Guidance Document dated 9/30/83. An adequate GLC/EC method is available for collection of data pertaining to the combined residues of dicamba and its 5-hydroxy metabolite, and 3,5-dichloro-o-anisic acid in or on plant samples. However, the nature of the residue in animals is not adequately understood (refer to the "Qualitative Nature of the Residue in Animals" section); therefore, the adequacy of the available analytical methods for animal commodities cannot be determined. Methods to be used in the future for data collection from animal commodities and enforcement of tolerances will be determined following receipt of the requested metabolism data. It is recommended that methods used for enforcement of tolerances for residues in or on plant commodities include an acid hydrolysis step.

The GLC/EC enforcement method currently in use (AM-0268A) detects dicamba, its 5-hydroxy metabolite, and 3,5-dichloro-o-anisic acid in plant samples (1966; MRID 00028263). The method is published in PAM Vol. II as Method I and, with only slight modifications, as Method II for analysis of these same residues in milk. Successful Agency validation tests have been conducted on these methods using sorghum grain (memorandum by G. Makhijani dated June 13, 1967, correspondence file for PP#7F0568) and milk (G.

Makhijani, January 6, 1970, correspondence file for PP#8F0725); samples in these studies were fortified only with dicamba per se. Residues are converted to the methyl esters and quantified using GLC/EC.

A modification of AM-0268A (AM-0691) has been used to collect data on residues of dicamba, its 5-hydroxy metabolite, and 3,6-dichloro-2-hydroxybenzoic acid in or on plant samples (1979; MRIDs 00079736 and 00088173). Method AM-0691 underwent a successful Agency validation test (E.H. Hayes, July 19, 1984, located in the correspondence file for PP#4F3041), in which recovery was: (i) 71-100% from grass samples fortified with dicamba at 200-700 ppm; (ii) 70-105% from grass fortified with the 5-hydroxy metabolite at 200-700 ppm; (iii) 68-72% from corn grain fortified with dicamba at 0.5-2 ppm; and (vi) 94-112% from corn grain fortified with the 5-hydroxy metabolite at 0.5-2 ppm. The agency has noted that the addition of an acid hydrolysis step increased extractions of dicamba residues from various commodities and that the modified method should be used for data collection and enforcement (memoranda by R. Perfetti dated August 14, 1984 and M. Firestone dated August 15, 1985 located in the Registration File for dicamba). Method AM-0691 has been modified (1986; MRID 00162206) to include hydrolysis of samples by treating with 1 N hydrochloric acid for 1.5 hours at 95 C (AM-0691A). A description of this same method was submitted as AM-0691B (1987; MRID 40233501), accompanied by data on recovery of dicamba and its 5-hydroxy metabolite from numerous plant commodities. The modified method (AM-0691A or B) must undergo successful confirmatory trials by an independent laboratory and Agency validation tests prior to being considered for publication in PAM Vol. II to be used for enforcement of tolerances.

A GLC/EC method, AM-0685 (1979; MRID 00079744), which is a modification of AM-0268A, has been used to determine dicamba and 3,6-dichloro-2-hydroxybenzoic acid (both as the methyl ester of dicamba) in milk, muscle, liver, kidney, and fat. A successful Agency validation study was conducted, in which recoveries were 85-95% from milk samples fortified with dicamba and 3,6-dichloro-2-hydroxybenzoic acid each at 0.5-1 ppm and 80-90% from samples of ground beef fortified with each compound at 0.2-0.4 ppm (memorandum by K. Zee dated September 1, 1982 and located in the correspondence file for PP# 1F2569).

No data are available regarding the recovery of dicamba or its metabolites using the multiresidue protocols in PAM Vol. I.

- Representative samples of plant and animal commodities bearing dicamba residues of concern must be subjected to multiresidue protocols I and III published in PAM Vol. I, Appendix II, available from the National Technical Information Service under Order No. PB 203734/AS.

- Successful confirmatory trials of the method designated AM-0691A and AM-0691B must be conducted by an independent laboratory. Results of at least one set of samples each for an oil seed crop and a forage crop must be submitted. No more than three sets of samples per commodity may be tested to achieve successful recovery rates of 70-120 % with negligible interference compared to the established tolerances. For additional details of data requirements, refer to PR Notice 88-5, Tolerance Enforcement Methods - Independent Laboratory Confirmation by Petitioner.

- The nature of the residue in animals is not adequately understood. If the metabolism studies requested in "Qualitative Nature of the Residue in Animals" reveal the presence of additional metabolites of concern, additional validated methods for data collection and tolerance enforcement may be required.

-

References (used):

MRID(s): 00028263. 00079736. 00079744. 00088173. 00162206*. 40233501*.

References (not used):

[The following references duplicate previously cited information or contain descriptions of methods not used to collect residue data for dicamba.]

MRID(s): 00004542. 00016439. 00021920. 00022467. 00022533. 00022667. 00022660. 00022668. 00022756. 00023686. 00023699. 00025331. 00025334. 00025335. 00025336. 00025337. 00025343. 00025345. 00026242. 00028264. 00028272. 00028273. 00028274. 00028277. 00028306. 00028307. 00028311. 00028312. 00028319. 00028320. 00028321. 00028322. 00028323. 00028324. 00028364. 00028365. 00028367. 00028369. 00028370. 00028371. 00028372. 00028373. 00028374. 00079737. 00079739. 00087926. 00092469. 00092477. 00102944. 00133567. 00161859.

Discussion of the data:

N/A.

Discussion of the data:

N/A.

STORAGE STABILITY DATA

Conclusions:

The Dicamba Guidance Document dated 9/30/83 required additional data pertaining to storage stability. Additional data (unavailable for review in this SRR) were submitted in support of PP#3F2794 and have been reviewed by the Agency. Data on the stability of residues in or on corn commodities stored frozen for 17 months indicate that residues are not stable, decreasing 10-42% in stalks and 23-85% in grain; residues were stable in samples of wheat grain and straw stored for 12 months in the same study (EPA memorandum by M. Firestone dated 9/25/84, located in the correspondence file for PP#3F2794). In contrast, additional data (Velsicol Report No. 480068-82) indicated that residues are stable in or on wheat, corn, and sorghum commodities stored frozen for 23-36 months, except in one sample of wheat grain in which residues declined 46% in 27 months. The latter submission was reviewed by M. Firestone (in a memorandum dated 8/15/85, located in the correspondence file for PP#3F2794), who concluded that the disparity in the results of the two studies needed to be addressed by the registrant. There has been no response to this request.

Storage stability data have been submitted with a processing study on wheat grain (1986; MRID 40663801), indicating that residues of dicamba and its 5-hydroxy metabolite are stable in or on wheat grain, bran, germ, and flour samples stored at -18 to -7 C for 119-121 days. Otherwise, the requirement for storage stability data listed in the Guidance Document remains outstanding, as does an explanation for the disparity in the data from the two submissions reviewed by M. Firestone in conjunction with PP#3F2794). The Agency requires that storage intervals and sample storage conditions be reported for all residue data submitted in support of tolerances or otherwise required by the Agency, and that the residue data be accompanied by data depicting the stability of all residues of concern in storage. The following data are required:

- The sample storage conditions and intervals must be supplied for all required and previously submitted residue data for plant and animal commodities. Storage stability data in support of previously submitted residue data are required for only those samples deemed to be useful for tolerance assessment. Data are also required which depict the decline in levels of dicamba

residues of concern in commodities stored under the range of conditions and for the range in intervals specified. Crop samples bearing measurable weathered residues or fortified with dicamba residues of concern and fortified meat, milk, and egg samples must be analyzed immediately after harvest or fortification and again after storage intervals that represent actual residue sample storage conditions and allow for reasonable unforseen delays in sample analysis. In laboratory tests using fortified samples, the pure active ingredient and pure metabolites must be used. However, if field weathered samples are used, the test substance must be a typical end-use product. For additional guidance on conducting storage stability studies, the Registrant is referred to an August 1987 Position Document on the Effects of Storage on Validity of Pesticide Residue Data available from NTIS under order no. PB 88112362/AS.

References (used):

MRID(s): 40663801*.

Discussion of the data:

Sandoz Crop Protection Corp. (1986; MRID 40663801) submitted data pertaining to the stability of residues of dicamba and its 5-hydroxy metabolite in or on fortified wheat grain and in bran, germ, and flour. Zero-time samples were fortified with 0.1 or 0.2 ppm of each compound and stored samples were fortified at 1 ppm. Recovery from zero-time samples was 93-100% (dicamba) and 89-96% (5-hydroxy metabolite); recovery was 109-126% and 75-97%, respectively from samples stored for 119-121 days at -18 to -7 C. Analyses were conducted using GLC/EC method AM-0691A; the limit of detection was 0.01 ppm for each compound. Apparent residues in or on untreated samples were <0.01(nondetectable)-0.2 ppm of dicamba and <0.01 ppm (nondetectable) for the 5-hydroxy metabolite.

These data indicate that residues of dicamba and its 5-hydroxy metabolite are stable in or on wheat grain, bran, germ, and flour samples stored at -18 to -6 C for 119-121 days. Otherwise, the requirement for storage stability data listed in the Guidance Document remains outstanding.

MAGNITUDE OF THE RESIDUE IN PLANTS

It should be noted that the conclusions stated in this section regarding the adequacy of established tolerances may change on receipt of the required analytical method validation data. The registrant should be urged to submit all required data on analytical methods prior to initiation of required field trials and processing studies.

Most of the crop residue data discussed in the interim Residue Chemistry Chapter were generated using analytical methods that do not include a hydrolysis step. Studies of dicamba metabolism in plants have shown that conjugated metabolites constitute a significant proportion of the terminal residue in some crops. The validity of the crop residue data cannot be ascertained until it has been demonstrated that the residue analytical methods recover all residues of concern.

Technical dicamba may contain as impurities 2,7-dichlorodibenzo-p-dioxin (2,7-DCDD) and dimethyl-N-nitrosamines. In the past, levels of these impurities have been detected in the technical at 50 ppb and 0.1-3 ppm, respectively. The issue of residues of these compounds in crops was raised in an EPA memorandum by M. Kovacs dated 3/31/83, located in the correspondence file for PP#3F2794 and has since been discussed in numerous memoranda in which RCB deferred to Toxicology Branch as to the acceptability of theoretical levels of these impurities in crops based on previously submitted product chemistry data. Additional data regarding polyhalogenated dibenzo-p-dioxins/dibenzofurans (HDDs and HDFs) and nitrosamines in technical dicamba are being requested (refer to the Dicamba SRR product Chemistry Chapter). Following receipt of these data, the existence of toxicologically significant levels of impurities in or on plant commodities will be addressed.

The conclusions stated in this section address only the minimum residue chemistry data base acceptable for establishing crop group tolerances. The registrant(s) should refer to 40 CFR 180.34 for complete requirements should they elect to propose crop group tolerances.

Legume Vegetables Group

Conclusions for the Legume Vegetables Group:

A crop group tolerance is not appropriate at the present time. If the registrant seeks a crop group tolerance, the following are required:

- Use directions must be proposed, and appropriate supporting residue data submitted for the representative group members beans (one succulent and one dried variety) and peas (one succulent and one dried variety).

Soybeans

Tolerance(s):

A tolerance of 0.05 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-2-hydroxybenzoic acid in or on soybeans [40 CFR §180.227(b)].

Use directions and limitations:

The 4 lb/gal SC/L formulation of the dimethylamine salt of dicamba is to be used for broadcast, banded, or directed spray soil application to control weeds in the period after harvest in the late summer or fall, prior to planting of soybeans, at 0.25-2 lb ae/A in 3-10 gal/A for aerial spraying or 5-50 gal/A for ground treatments. Not more than 2 lb ae/A may be applied during any fallow period. These use directions were obtained from Section B of PP#2F2690.

Conclusions:

A tolerance of 0.05 ppm for residues of dicamba and 3,6-dichloro-2-hydroxybenzoic acid has been established since the issuance of the Guidance Document dated September 30, 1983. Residue data on soybeans (1982; MRID 00102944) were reviewed in an EPA memorandum by R.B. Perfetti dated September 20, 1982 and located in the correspondence file for PP#2F2690. It was concluded that the available data support a tolerance of 0.05 ppm for residues of dicamba and 3,6-dichloro-2-hydroxybenzoic acid in or on soybeans and are sufficient to determine that residues are not likely to concentrate in soybean meal, hulls, soapstock, crude oil, refined oil, or refined/bleached oil. We note, however, that the Agency now requires data on grain dust from soybeans (EPA memorandum by C. Trichilo dated Feb. 13, 1987). The following additional data are required:

- Data depicting the combined residues of dicamba and its DCHBA metabolite in or on grain dust from soybeans bearing measurable weathered residues. If residues concentrate in this commodity, an appropriate feed additive tolerance must be proposed.

Note to the PM: Dicamba product labels reviewed for this SRR do not bear directions for use on soybeans. If the registrant(s) or other interested parties do not wish to amend the pertinent

labels accordingly, we recommend that the tolerance for dicamba residues in or on soybeans be revoked.

No Canadian tolerance, Mexican tolerance, or Codex MRL has been established for residues of dicamba in or on soybeans. Therefore, no questions of compatibility exist with respect to the Codex MRL.

References (used):

MRID(s): 00102944.

References (not used):

[The following reference(s) duplicate previously cited information.]

MRID(s): 00075720.

Discussion of the data:

N/A.

Foliage of Legume Vegetables Group

Conclusions for the Foliage of Legume Vegetables Group:

A crop group tolerance is not appropriate at the present time. If the registrant seeks a crop group tolerance, the following are required:

- Use directions must be proposed, and appropriate supporting residue data submitted for the forage and hay of representative group members beans and field peas.

Soybean forage, hay, and straw

Tolerance(s):

Tolerances of 0.1 ppm have been established for the combined residues of dicamba and its metabolite 3,6-dichloro-2-hydroxybenzoic acid in or on soybean forage and soybean hay [40 CFR §180.227(b)].

Use directions and limitations:

The 4 lb/gal SC/L formulation of the dimethylamine salt of dicamba is to be used for broadcast, banded, or directed spray soil application to control weeds in the period after harvest in the late summer or fall, prior to planting of soybeans, at 0.25-2 lb ae/A in 3-10 gal/A for aerial spraying or 5-50 gal/A for

ground treatments. Not more than 2 lb ae/A may be applied during any fallow period. These use directions were obtained from Section B of PP#2F2690.

Conclusions:

Tolerances of 0.1 ppm for residues of dicamba and 3,6-dichloro-2-hydroxybenzoic acid in or on soybean forage and soybean hay have been established since the issuance of the Guidance Document dated September 30, 1983. Residue data on soybean forage and hay (1982; MRIDs 00075729 and 00102944) were reviewed in an EPA memorandum by R.B. Perfetti dated September 20, 1982 and located in the correspondence file for PP#2F2690. It was concluded that the available data support the tolerances of 0.1 ppm for the combined residues of dicamba and 3,6-dichloro-2-hydroxybenzoic acid in or on soybean forage and hay.

Note to the PM: Dicamba product labels reviewed for this SRR do not bear directions for use on soybeans. If the registrant(s) or other interested parties do not wish to amend the pertinent labels accordingly, we recommend that the tolerances for dicamba residues in or on soybean forage and soybean hay be revoked.

No Canadian tolerance, Mexican tolerance, or Codex MRL has been established for residues of dicamba in or on soybean forage or hay. Therefore, no questions of compatibility exist with respect to the Codex MRL.

References (used):

MRID(s): 00075729. 00102944.

References (not used):

[The following reference(s) duplicate previously cited information.]

MRID(s): 00075720.

Discussion of the data:

N/A.

Cereal Grains Group

Conclusions for the Cereal Grains Group:

A crop group tolerance is not appropriate at the present time. If the registrant seeks a crop group tolerance, the following data are required.

- Use directions and appropriate supporting residue data submitted for the additional crop group member rice.

Barley grain

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on barley grain [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L dimethylamine salt, 4 lb/gal SC/L 2-(2-aminoethoxy) ethanol salt, 4 lb/gal SC/L potassium salt, and 2 lb/gal SC/L sodium salt formulations are registered for postemergence broadcast applications to barley. Applications are to be made to fall-seeded barley at a maximum rate of 0.125 lb ae/A prior to the jointing stage, and at a maximum rate of 0.09 lb ae/A to spring-seeded barley before it exceeds the three-leaf stage. Treatments may be made in 5 to 50 gallons finished spray per acre using ground equipment or 3 to 10 gallons per acre using aerial equipment.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1967; MRID 00028252) support the established tolerance for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on barley grain. No additional data were required. Additional data were submitted (1986; MRID 00162206) depicting these same residues following application of the 4 lb/gal SC/L dimethylamine or 2-(2-aminoethoxy) ethanol salt formulation on spring-seeded barley at 0.125 lb ae/A. The available data support the established tolerance for residues in or on barley grain. No processing study has been conducted using treated barley grain; however, data from processing studies using wheat grain indicate that residues concentrate 2x in milled fractions. Based on these data, feed additive tolerances of 1 ppm are required for the combined residues of dicamba and its 5-hydroxy metabolite in milling fractions (except flour) derived from barley grain. Data depicting concentration of residues in grain dust from barley are unavailable; the data requested for wheat grain dust will fulfill this requirement for barley. The following is required:

- Food/feed additive tolerances of 1 ppm must be proposed for combined residues of dicamba and its 5-hydroxy metabolite in each of the barley milled products,

excluding flour, based on the observed 2x concentration factor during processing of wheat grain.

A Canadian tolerance of 0.1 ppm has been established for dicamba residues in or on barley. There is no Mexican tolerance or Codex MRL; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00028252. 00162206*.

References (not used):

[The following reference(s) contain duplicate data or data not useful in assessing the tolerance.]

MRID(s): 00004525. 00004530. 00004531. 00004532. 00022468. 00023687. 00023688. 00028209. 00028211. 00028219. 00028220. 00028363. 00028400. 00055545. 00075718. 00075726. 00075727. 00075728.

Discussion of the data:

Sandoz Crop Protection Corp. (1986; MRID 00162206) submitted data from three tests conducted in ND(1), OR(1), and SD(1) depicting residues of dicamba and its 5-hydroxy-metabolite in or on spring-seeded barley using the 4 lb/gal SC/L dimethylamine (DMA) salt or the 2-(2-aminoethoxy) ethanol (DGA) salt formulation. Three samples of grain were harvested 69-86 days following a single postemergence ground application of each formulation at 0.125 lb ae/A (1x the maximum registered rate) in 17-20 gallons of water using ground equipment. Combined residues were <0.02-0.312 ppm (including dicamba at <0.01 ppm (nondetectable)-0.27 ppm and the 5-hydroxy metabolite at <0.01-0.042 ppm) in or on the six grain samples. Apparent combined residues in the three untreated samples were <0.02 ppm (nondetectable) to <0.022 ppm. The samples were analyzed using method AM-0691A; a GLC/EC method which has a limit of detection of 0.01 ppm each for dicamba and its 5-hydroxy-metabolite; the method is adequate for data collection. Recovery was 84-100% from samples fortified with each compound at 0.05-0.5 ppm. Sample storage prior to analysis was unspecified.

The geographic representation is adequate for barley, since the states of ND(26%), OR(3%), SD(6%), in addition to MN(9%) and Canada (represented in previously submitted data) and the neighboring states of ID(12%) and MT(18%) account for >70% of the 1987 U.S. commercial barley production (USDA Crop Database, Jan. 1988, Ag. Statistics Board, NASS). The available data support the established tolerance for residues in or on barley grain. No processing study has been conducted using treated barley grain;

however, data from processing studies using wheat grain indicate that residues concentrate 2x in milled fractions. Based on these data, food/feed additive tolerances of 1 ppm are required for the combined residues of dicamba and its 5-hydroxy metabolite in milling fractions (except flour) derived from barley grain. Data depicting concentration of residues in grain dust from barley are unavailable; the data requested for wheat grain dust will fulfill this requirement for barley.

Corn grain

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on corn grain (40 CFR 180.227[a]).

Use directions and limitations:

The grazing or harvest of treated corn for dairy or beef cattle feed prior to the ensilage (milk) stage is prohibited. No PHIs have been established for any formulation type.

Dimethylamine salt: The 4 lb/gal SC/L formulation of the dimethylamine salt of dicamba is registered for preplant, preemergence, or postemergence broadcast or banded application to field corn in till or no-till systems at 0.25-0.5 lb ae/A. For preemergence use, corn must be planted 1.5 inches or more below the soil surface. Postemergence application may be made until corn is 5-36 inches in height or until 15 days before tassel emergence. No more than one pre- and one postemergence application may be made per season. The 1.25 lb/gal EC/MAI formulation is registered for postemergence broadcast application at 0.12-0.25 lb ae/A and banded application at 0.04-0.08 lb ae/A to field corn in 7-25 gal/A. Applications may be made over the top until corn plants are 10 inches tall; no applications may be made after plants are 36 inches tall.

Potassium salt: The 4 lb/gal SC/L and 1.1 lb/gal FlC formulations of the potassium salt of dicamba are registered for preplant, preemergence, or postemergence broadcast or banded application to field corn in till or no-till systems at 0.25-0.5 lb ae/A. For preemergence use, corn must be planted 1.5 inches or more below the soil surface. Postemergence application at 0.3 lb ae/A may be made until corn is 5-36 inches in height or until 15 days before tassel emergence. The FlC formulation may be applied through the 5 leaf stage of corn. No more than one pre- and one postemergence application may be made per season.

Aluminum salt: The 49.9% WP formulation of the aluminum salt of dicamba is registered for preplant, preemergence, or

postemergence broadcast or banded surface, surface blended, or soil incorporated application to field corn at 0.25-1.0 lb ae/A. Postemergence application may be made until corn is 5 inches tall.

2-(2-Aminoethoxy) ethanol salt: The 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt of dicamba is registered for preplant, preemergence, or early postemergence broadcast or directed spray application to field corn in till or no-till systems at 0.25-0.5 lb ae/A/application in 5-50 gal/A for ground application and 3-10 gal/A for aerial application. For preemergence use, corn must be planted 1.5 inches or more below the soil surface. Postemergence application may be made at 0.25 lb ae/A until corn is 5-36 inches in height or until 15 days before tassel emergence. Preplant or preemergence to early postemergence application may be followed by one postemergence application during the growing season.

Conclusions:

The Dicamba Guidance Document dated September, 1983 concluded that the available data (1975; MRID 00015636, 1976; MRID 00015637, 1978; MRID 00015640, 1976; MRID 00015641, 1975: MRID 00015642, 1978: MRID 00015786, 1977; MRID 00016435, 1977; MRID 00016436, 1977; MRID 00016437, 1977; MRID 00016438, 1970; MRID 00022612, 1970; MRID 00022613, 1965; MRID 00022618, 1973; MRID 00023584, 1965; MRID 00023684, 1975; MRID 00025364, 1975; MRID 00025383, 1966; MRID 00028269, 1981; MRID 00075715, 1981; MRID 00088172) support the established tolerance of 0.5 ppm for residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on corn grain. However, data were not submitted depicting the concentration of dicamba residues in processed corn products, and the Agency now requires data on grain dust from corn (EPA memorandum by C. Trichilo dated 2/13/87). The following additional data are required:

- Data depicting the combined residues dicamba and its 5-hydroxy metabolite in starch, crude oil, and refined corn from wet milling; grits, meal, flour, and crude and refined oils from dry milling; and in grain dust derived from corn grain bearing measurable, weathered residues. If residues concentrate in any of these commodities, an appropriate food/feed additive tolerance must be proposed.

No Canadian or Mexican tolerance or Codex MRL has been established for residues of dicamba in or on corn grain. Therefore, no questions of compatibility exist with respect to the Codex MRL.

References (used):

MRID(s): 00015636. 00015637. 00015640. 00015641. 00015642. 00015786. 00016435. 00016436. 00016437. 00016438. 00022612. 00022613. 00022618. 00023584. 00023684. 00025364. 00025383. 00028269. 00075715. 00088172.

References (not used):

[The following reference(s) duplicate previously cited information.]

MRID(s): 00015787. 00025393. 00028201. 00028214. 00028215. 00028217. 00028379. 00028384. 00030104. 00030693. 00068062. 00075727. 00161859. 00075720. 00075729. 00030697. 00053693.

Discussion of the data:

N/A.

Millet, proso, grain

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on millet, proso, grain [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L formulation of the dimethylamine salt is registered for use on millet as a postemergence, broadcast application at a maximum rate of 0.125 lb ae/A, and is restricted to the state of NE (EPA SLN No. NE830009). Treatments may be at the two- to five-leaf stage in 5 to 50 gallons of finished spray per acre using ground equipment or in 3 to 10 gallons of water per acre by air. No PHI has been established.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1973-1975; MRID 00025330) support the pending tolerance (now established) for residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on proso millet grain. No additional data were required. However, no data are available reflecting aerial application or the concentration of residues during processing. These data are not required, since the data available and requested for wheat grain will, by translation, be used to determine the appropriate level

for food and feed additive tolerances. The following data are required:

- A food/feed additive tolerance of 1 ppm must be proposed for combined residues of dicamba and its 5-hydroxy-metabolite in each millet milled product of millet, excluding flour, based on the observed 2x concentration factor in wheat.

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in or on proso millet grain; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00025330.

Discussion of the data:

N/A.

Oat grain

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on oat grain [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L dimethylamine salt, 4 lb/gal SC/L 2-(2-aminoethoxy) ethanol salt and the 4 lb/gal SC/L potassium salt formulations are registered for a single postemergence, broadcast application at to oats at 0.125 lb ae/A. The 2 lb/gal SC/L sodium salt formulation may be applied at the same maximum rate, as a preplant, preemergence or postemergence, broadcast application. Treatments may be made in 5-50 gallons of water per acre using ground equipment or in 3-10 gallons using aerial equipment. Applications must be made prior to the jointing stage for fall-seeded oats and before the five-leaf stage for spring-seeded oats.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1967; MRID 00028252) support the established tolerance for combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on oat grain. No additional data were required. No data were submitted

reflecting aerial application or from an oat processing study. However, additional data are not required; since the data presently available or requested for wheat grain will, by translation, be used to assess the established tolerance for residues in or on oat grain and to determine the appropriate level(s) in processed products from oat grain. The following is required:

- Food/feed additive tolerances of 1 ppm must be proposed for combined residues of dicamba in oat milled products, excluding flour, based on data reflecting a 2x concentration factor in wheat milled fractions.

A Canadian tolerance of 0.1 ppm has been established for dicamba residues in or on oats. No Mexican tolerance or Codex MRL has been established for dicamba residues in or on oat grain; therefore, no questions of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00023687. 00028525.

References (not used):

[The following reference(s) contain duplicate data or data that are not useful in assessing the tolerance.]

MRID(s): 00004518. 00004526. 00004527. 00004528. 00004529. 00022468. 00022471. 00022482. 00022483. 00022538. 00023688. 00028205. 00028210. 00028217. 00028219. 00028363. 00028401. 00055545. 00075718. 00075726. 00075728.

Discussion of the data:

N/A.

Sorghum grain

Tolerance(s):

A tolerance of 3 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on sorghum grain [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L formulation of the dimethylamine salt is registered for use as a preplant, preemergence or postemergence, broadcast or banded application to sorghum at 0.25 lb ae/A.

Applications may be made before the plants are 15 inches tall. The 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt may be applied as either a preplant or postemergence treatment at the same rate, at least 15 days prior to planting or not until plants are in the three-leaf stage but before they are 15 inches tall. The 4 lb/gal SC/L formulation of the potassium salt is also registered for postemergence application only and may be applied at the same rate. Applications may be made in 5-50 gallons of finished spray per acre using ground equipment or in 3-10 gallons/acre aerially. Only one application per growing season is permitted and a 30-day PHI is in effect. Grazing or harvesting for livestock feed prior to crop maturity is prohibited.

- Preharvest broadcast application is permitted in OK, and TX, and in IA, IL, IN, KS, MI, MO, NE, and OH (EPA SLN No. IN800012) using the 4 lb/gal SC/L formulation of the dimethylamine salt at 0.25 lb ae/A. In addition, preharvest application is permitted in OK and TX using the 2-(2-aminoethoxy) ethanol and potassium salts. Applications are to be made after the plants have reached the soft dough stage. In IN, applications may be from September 15 until the first killing frost.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1964-1965; MRIDs 00022622 and 00078448) partially satisfy data requirements for sorghum. Data pertaining to sorghum milling fractions are needed. No additional data have been submitted in response to the guidance document; therefore, this data gap remains outstanding. In addition, no data are available reflecting postemergence treatment using aerial equipment and no data are available depicting residues resulting from registered preharvest treatment. The following additional data are required:

- Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum grain following a single postemergence broadcast application of a representative SC/L formulation at 0.25 lb ae/A using aerial equipment according to label directions. Application must be made at or about the time when plants are 15 inches tall and harvested 30 days thereafter. Tests must be conducted in KS(37%) and TX(23%) since these states accounted for ca. 70% of the 1987 U.S. sorghum grain production, if KS is representative of NE(15%) (Crop Database, Jan. 1988, Ag. Statistics Board, USDA, NASS).

- Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum grain following a single preharvest broadcast application of a

representative SC/L formulation at 0.25 lb ae/A using ground and aerial equipment in separate tests according to label directions. Applications must be made after the plant has reached the soft dough stage. Tests must be conducted in the states of OK or TX; IL, IN, or MI; and KS, MO, or NE, in order to adequately represent the regions in which this use is permitted.

- A processing study depicting the combined residues of dicamba and its 5-hydroxy metabolite in milled products (flour and starch) and grain dust from sorghum grain bearing measurable, weathered residues. If residues concentrate in any product, an appropriate food/feed additive tolerance must be proposed.

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in or on sorghum grain; therefore, no question of compatibility exists with respect to The Codex MRL.

References (used):

MRID(s): 00022622. 00078448.

References (not used):

[The following reference(s) contain duplicate data or data that is not useful in assessing the tolerance.]

MRID(s): 00028216. 00028403. 00030695. 00068062. 00073273. 00075719. 00075727. 00075729.

Discussion of the data:

N/A.

Wheat grain

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on wheat grain [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L dimethylamine salt, 4 lb/gal SC/L 2-(2-aminoethoxy) ethanol salt, 4 lb/gal SC/L potassium salt, and 2 lb/gal SC/L sodium salt formulations are registered for preplant, preemergence, or postemergence, broadcast application to wheat 0.125 lb ae/A. Treatments may be made in 5-20 gallons of

water/acre using ground equipment or 3-5 gallons aerially. Postemergence application must be made prior to the jointing stage for fall-seeded wheat and before the five-leaf stage for spring-seeded wheat. Grazing or harvesting for livestock feed prior to crop maturity is prohibited.

The above formulations, with the exception of the sodium salt, are also registered for a single preplant broadcast application in ID, MT, NV, OR, UT, and WA at 4-6 lb ae/A, 30 days prior to planting wheat. Only one application per year is permitted.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data support the established tolerance for combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on wheat grain. No additional data were required. Additional data were submitted depicting dicamba residues of resulting from use of the dimethylamine and 2-(2-aminoethoxy) ethanol salt formulations on wheat, as well as data from a wheat processing study (1986; MRIDs 00162206 and 40663801, respectively). The processing study revealed a concentration of residues of dicamba of 2x in milled products of wheat. Thus, food/feed additive tolerances of 1 ppm must be proposed. No data were data submitted pertaining to residues in wheat grain dust. Additional residue data (not previously discussed) are available reflecting registered preemergence treatment of fall seeded wheat (1970; MRID 00028398).

The following additional data are required:

- A processing study depicting the combined residues of dicamba and its 5-hydroxy metabolite in grain dust derived from wheat grain bearing measurable, weathered residues. If residues concentrate, an appropriate feed additive tolerance must be proposed.

- Food/feed additive tolerances of 1 ppm must be proposed for combined residues of dicamba and its 5-hydroxy-metabolite in wheat milled products, excluding flour, based on the observed 2x concentration factor.

A Canadian tolerance of 0.1 ppm has been established for dicamba residues in or on wheat. No Mexican tolerance or Codex MRL has been established for dicamba residues in or on wheat grain; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00004541. 00004566. 00023687. 00025394. 00028398. 00162206*. 40663801*.

References (not used):

[The following reference(s) contain duplicate data or data that are not useful in assessing the tolerance.]

MRID(s): 00004519. 00004520. 00004521. 00004522. 00004523. 00004524. 00004620. 00022470. 00022531. 00023687. 00023688. 00023701. 00028206. 00028220. 00028252. 00028363. 00028375. 00028399. 00051213. 00055545. 00068062. 00075716. 00075718. 00075726. 00075727. 00075728. 00126684.

Discussion of the data:

Sandoz Crop Protection Corp. (1986; MRID 00162206) submitted data from six tests conducted in CO(1), MT(1), ND(2), OK(1), and SD(1) depicting combined residues of dicamba and its 5-hydroxy-metabolite in or on spring and winter wheat using the 4 lb/gal SC/L dimethylamine salt or the 2-(2-aminoethoxy) ethanol salt formulations. Twelve samples of wheat grain treated with each formulation were harvested 20-89 days following a single postemergence ground application at 0.125 lb ae/A (1x the maximum registered use rate) in 7-20 gallons of water. Combined residues were <0.02 ppm (nondetectable), including <0.01 ppm for each dicamba and the 5-hydroxy metabolite. Apparent combined residues in the six untreated samples were <0.02 ppm (nondetectable). The samples were analyzed using method AM-0691A; a GLC/EC method which has a limit of detection of 0.01 ppm each for dicamba and its 5-hydroxy-metabolite. Recovery was 84-100% from samples fortified with each compound at 0.02-0.05 ppm. Samples were stored at -20 C prior to analysis for an unspecified length of time.

Velsicol Chemical Co. (1970; MRIDs 00023687 and 00028398) submitted data from five tests conducted in ID(2) and TX(3) depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on wheat grain harvested 188-308 days following a single preplant application of an unspecified formulation at 8-16 lb ae/A (1.5-2.7x the maximum registered rate). Combined residues were <0.02-<0.12 ppm (including 0.01-0.05 ppm of dicamba and <0.01, nondetectable,-0.08 ppm of the 5-hydroxy metabolite). Apparent combined residues in or on untreated samples were <0.02-<0.08 ppm (nondetectable for dicamba and the metabolite). Analyses were conducted using unspecified GLC methods; the limits of detection for each compound were <0.04 ppm (MRID 00028398) or 0.01 ppm (MRID 00023687). Storage intervals and conditions were not specified.

Sandoz Crop Protection Corp. (1986; MRID 40663801) submitted a processing study in which wheat grain was treated with the dimethylamine salt at 0.5 lb ae/A (4x the maximum registered use

rate). Residues of dicamba in or on one sample of grain analyzed three times were 0.023-0.032 ppm (average, 0.029 ppm). Following processing, residues decreased in flour (0.012 ppm), were unchanged in bran (0.035 ppm), and concentrated 2x in wheat shorts and germ (0.058 and 0.064 ppm respectively). Residues of the 5-hydroxy-metabolite were all <0.01 ppm (nondetectable). No data were submitted depicting combined dicamba residues in grain dust.

The geographic representation is adequate, since the states of CO(5%), MT(7%), ND(13%), OK(6%), SD(5%) plus ID(4%), MN(5%), OR(3%) and WA(5%) (previously submitted) accounted for >70% of the 1987 U.S. commercial wheat production (USDA Crop Database, Jan. 1988, Ag. Statistics Board, NASS). The available data support the established tolerance for the combined residues of dicamba and its 5-hydroxy metabolite in or on wheat grain. However, the proposal of a food/feed additive tolerance is required for combined residues of dicamba and 5-hydroxy dicamba in wheat milled products, excluding flour. No data were submitted depicting residues in wheat grain dust. Additional data are, therefore, required.

Forage, Fodder and Straw of Cereal Grains Group

Conclusions for the Forage, Fodder and Straw of Cereal Grains Group:

A crop group tolerance is not appropriate at the present time. If the registrant seeks a crop group tolerance, the following data are required:

- Additional data to support the established tolerances for residues in or on the representative group members sorghum forage and fodder and wheat straw.
- Use directions must be proposed and appropriate supporting residue data submitted for the additional representative group member, rice forage and hay.

Barley forage, hay and straw

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or barley straw [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L dimethylamine salt, 4 lb/gal SC/L 2-(2-aminoethoxy) ethanol salt, 4 lb/gal SC/L potassium salt, and 2 lb/gal SC/L sodium salt formulations are registered for postemergence broadcast applications to barley. Applications are to be made to fall-seeded barley at a maximum rate of 0.13 lb ae/A prior to the jointing stage, and at a maximum rate of 0.1 lb ae/A to spring-seeded barley before it exceeds the three-leaf stage. Treatments may be made in 5-50 gallons finished spray per acre using ground equipment or 3-10 gallons per acre using aerial equipment. Grazing or harvesting for livestock feed prior to crop maturity is prohibited for these applications using the dimethylamine and sodium salts.

The 4 lb/gal SC/L formulations of the dimethylamine, aminoethoxy ethanol, and potassium salts may also be applied to barley grown for pasture use only. Application to pastures are permitted at rates up to 8 lb ae/A; details of specific PHIs and pregrazing intervals with regard to lactating animals may be found in the Grasses, Pasture and Rangelands section. It should be noted that dicamba may be phytotoxic to barley if applied at rates in excess of those specified for annual weeds (0.75 lb ae/A). Therefore, assuming a maximum rate of 0.75 lb ae/A, the following restrictions are in effect for this use: (i) a 7-day pregrazing interval and a 37-day PHI for application at up to 0.5 lb ae/A; and (ii) a 21-day pregrazing interval and a 51-day PHI for application at rates up to 0.75 lb ae/A. There is no pregrazing interval for non-lactating animals. A 30-day pre-slaughter interval has been established for meat animals.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1967; MRID 00028252) support the established tolerance for combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on barley straw. No additional data were required. Additional data were submitted (1986; MRID 00162206) depicting combined dicamba residues on spring barley straw using both 4 lb/gal SC/L dimethylamine and 2-(2-aminoethoxy) ethanol salt formulations. These data, along with those reviewed previously, indicate that combined residues in or on barley straw will not exceed the established tolerance following registered postemergence treatments at 0.125 lb ae/A. However, no data were submitted reflecting aerial application. In addition, we note that registered use on pastures includes barley grown for pasture and that residues could occur in or on forage and hay following these uses. No tolerances have been established for residues in or on barley forage and hay, nor are there data available reflecting these uses. No additional data are required, however, since the data requested for wheat forage, hay, and straw will, by

translation, satisfy the requirements for data on barley. The following is required:

- The registrant must amend appropriate product labels to specify a maximum application rate to barley grown for pasture only.

- Tolerances must be proposed for the combined residues of dicamba and its 5-hydroxy metabolite in or on barley forage and hay and appropriate supporting residue data must be submitted.

A Canadian tolerance of 0.1 ppm has been established for dicamba residues in or on barley. No Mexican tolerance or Codex MRL has been established; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00028252. 00162206*.

References (not used):

[The following reference(s) contain either duplicate data or data that are not useful in assessing the tolerance.]

MRID(s): 00004525. 00004530. 00004532. 00023687. 00028219. 00028220. 00028400. 00075726. 00075727. 00075728.

Discussion of the data:

Sandoz Crop Protection Corp. (1986; MRID 00162206) submitted data from three tests conducted in ND(1), OR(1), and SD(1) depicting residues of dicamba and its 5-hydroxy-metabolite in or on spring barley straw resulting from application of the 4 lb/gal SC/L dimethylamine salt or the 2-(2-aminoethoxy) ethanol salt formulations. Three samples of barley straw were harvested 69-86 days following a single postemergence ground application of each salt formulation at 0.125 lb ae/A (1x the maximum registered use rate) in 17-20 gallons of water. Combined residues were <0.02 ppm (nondetectable; <0.01 ppm each of dicamba and 5-hydroxy dicamba) to 0.07 ppm for the DMA salt and <0.02 (nondetectable) to 0.084 ppm for the ethanol salt. Apparent combined residues in two untreated samples were <0.02 ppm (nondetectable). The samples were analyzed using method AM-0691A; a GLC method with a Hall electrolytic conductivity detector which has a limit of detection of 0.01 ppm for each dicamba and its 5-hydroxy-metabolite. Recoveries were 86-90% from samples fortified with each compound at 1.0 ppm. The duration and conditions of sample storage prior to analysis was unspecified.

The geographic representation is adequate for barley straw, since the states of ND(26%), OR(3%), SD(6%) plus MN(9%) (previously submitted) and the neighboring states of ID(12%) and MT(18%) account for >70% of the 1987 U.S. commercial barley production (USDA Crop Database, Jan. 1988, Ag. Statistics Board, NASS). The available data indicate that combined residues in or on barley straw will not exceed the established tolerance following registered postemergence treatment at 0.125 lb ae/A. However, we note that registered use on pastures includes barley grown for pasture and that residues could occur in or on forage and hay following these uses. No tolerances have been established for residues in or on barley forage and hay, nor are there data available reflecting these uses. No additional data are required, however, since the data requested for wheat forage, hay, and straw will, by translation, satisfy the requirements for data on barley.

Corn forage and fodder

Tolerance(s):

Tolerances of 0.5 ppm each have been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on corn forage and fodder (40 CFR 180.227[a]).

Use directions and limitations:

The grazing or harvest of treated corn for dairy or beef cattle feed prior to the ensilage (milk) stage is prohibited. No PHIs have been established for any formulation type.

Dimethylamine salt: The 4 lb/gal SC/L formulation of the dimethylamine salt of dicamba is registered for preplant, preemergence, or postemergence broadcast or banded application to field corn in till or no-till systems at 0.25-0.5 lb ae/A. For preemergence use, corn must be planted 1.5 inches or more below the soil surface. Postemergence application may be made until corn is 5-36 inches in height or until 15 days before tassel emergence. No more than one pre- and one postemergence application may be made per season. The 1.25 lb/gal EC/MAI formulation is registered for postemergence broadcast application at 0.12-0.25 lb ae/A and banded application at 0.04-0.08 lb ae/A to field corn in 7-25 gal/A. Applications may be made over the top until corn plants are 10 inches tall; no applications may be made after plants are 36 inches tall.

Potassium salt: The 4 lb/gal SC/L and 1.1 lb/gal FlC formulations of the potassium salt of dicamba are registered for preplant, preemergence, or postemergence broadcast or banded application to field corn in till or no-till systems at 0.25-0.5 lb ae/A. For preemergence use, corn must be planted 1.5 inches

or more below the soil surface. Postemergence application at 0.3 lb ae/A may be made until corn is 5-36 inches in height or until 15 days before tassel emergence. The F1C formulation may be applied through the 5 leaf stage of corn. No more than one pre- and one postemergence application may be made per season.

Aluminum salt: The 49.9% WP formulation of the aluminum salt of dicamba is registered for preplant, preemergence, or postemergence broadcast or banded surface, surface blended, or soil incorporated application to field corn at 0.25-1.0 lb ae/A. Postemergence application may be made until corn is 5 inches tall.

2-(2-Aminoethoxy) ethanol salt: The 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt of dicamba is registered for preplant, preemergence, or early postemergence broadcast or directed spray application to field corn in till or no-till systems at 0.25-0.5 lb ae/A/application in 5-50 gal/A for ground application and 3-10 gal/A for aerial application. For preemergence use, corn must be planted 1.5 inches or more below the soil surface. Postemergence application may be made at 0.25 lb ae/A until corn is 5-36 inches in height or until 15 days before tassel emergence. Preplant or preemergence to early postemergence application may be followed by one postemergence application during the growing season.

Conclusions:

The Dicamba Residue Chemistry Chapter dated 9/83 concluded that the available data (1975; MRID 00015636, 1976; MRID 00015637, 1978; MRID 00015640, 1976; MRID 00015641, 1975: MRID 00015642, 1978: MRID 00015786, 1977; MRID 00016435, 1977; MRID 00016436, 1977; MRID 00016437, 1977; MRID 00016438, 1970; MRID 00022612, 1970; MRID 00022613, 1965; MRID 00022618, 1973; MRID 00023584, 1965; MRID 00023684, 1975; MRID 00025364, 1975; MRID 00025383, 1966; MRID 00028269, 1981; MRID 00075715, 1981; MRID 00088172) support the established tolerances of 0.5 ppm for residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on corn forage and fodder. No additional data are required.

A Canadian tolerance of 0.1 ppm has been established for residues of dicamba in or on corn. No Mexican tolerance or Codex MRL has been established for residues of dicamba in or on corn. Therefore, no questions of compatibility exist with respect to the Codex MRL.

References (used):

MRID(s): 00015636. 00015637. 00015640. 00015641. 00015642.
00015786. 00016435. 00016436. 00016437. 00016438.

00022612. 00022613. 00022618. 00023584. 00023684.
00025364. 00025383. 00028269. 00075715. 00088172.

References (not used):

[The following reference(s) duplicate previously cited information.]]

MRID(s): 00015787. 00025393. 00028201. 00028214. 00028215.
00028217. 00028379. 00028384. 00030104. 00030693.
00068062. 00075727. 00161859. 00075720. 00075729.
00030697. 00053693.

Discussion of the data:

N/A.

Millet, proso, straw

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on proso millet straw [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L formulation of the dimethylamine salt is registered for use on millet as a postemergence, broadcast application at a maximum rate of 0.125 lb ae/A, and is restricted to the state of NE (EPA SLN No. NE830009). Treatments may be at the two- to five-leaf stage in 5 to 50 gallons of finished spray per acre using ground equipment or in 3 to 10 gallons of water per acre by air. No PHI has been established.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1973-1975; MRID 00025330) support the pending tolerance (now established) for residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on proso millet straw. No additional data were required.

Note to the PM: We note that millet straw is not considered a raw agricultural commodity or livestock feed item.

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in or on proso millet straw; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00025330.

Discussion of the data:

N/A.

Oat forage, hay, and straw

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in oat straw [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L dimethylamine salt, 4 lb/gal SC/L 2-(2-aminoethoxy) ethanol salt and the 4 lb/gal SC/L potassium salt formulations are registered for a single postemergence, broadcast application at to oats at 0.125 lb ae/A. The 2 lb/gal SC/L sodium salt formulation may be applied at the same maximum rate, as a preplant, preemergence or postemergence, broadcast application. Treatments may be made in 5-50 gallons of water per acre using ground equipment or in 3-10 gallons using aerial equipment. Applications must be made prior to the jointing stage for fall-seeded oats and before the five-leaf stage for spring-seeded oats. Grazing or harvesting for livestock feed prior to crop maturity is prohibited.

The 4 lb/gal SC/L formulations of the dimethylamine, aminoethoxy ethanol, and potassium salts may also be applied to oats grown for pasture use only. Application to pastures are permitted at rates up to 8 lb ae/A; details of specific PHIs and pregrazing intervals with regard to lactating animals may be found in the Grasses, Pasture and Rangelands section. It should be noted that dicamba may be phytotoxic to oats if applied at rates in excess of those specified for annual weeds (0.75 lb ae/A). Therefore, assuming a maximum rate of 0.75 lb ae/A, the following restrictions are in effect for this use: (i) a 7-day pregrazing interval and a 37-day PHI for application at up to 0.5 lb ae/A; and (ii) a 21-day pregrazing interval and a 51-day PHI for application at rates up to 0.75 lb ae/A. There is no pregrazing interval for non-lactating animals. A 30-day pre-slaughter interval has been established for meat animals.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1967; MRIDs 00023687 and 00028252)

support the established tolerance for combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on oat straw. No additional data were required. The available data indicate that combined residues in or on oat straw will not exceed the established tolerance following registered postemergence treatment at 0.125 lb ae/A. However, no data were submitted reflecting aerial application. In addition, we note that registered use on pastures includes oats grown for pasture and that residues could occur in or on forage and hay following these uses. No tolerances have been established for residues in or on oat forage and hay, nor are there data available reflecting these uses. No additional data are required, however, since the data requested for wheat forage, hay, and straw will, by translation, satisfy the requirements for data on oats. The following is required:

- The registrant must amend appropriate product labels to specify a maximum application rate to oats grown for pasture only.

- Tolerances must be proposed for the combined residues of dicamba and its 5-hydroxy metabolite in or on oat forage and hay and appropriate supporting residue data must be submitted.

A Canadian tolerance of 0.1 ppm has been established for dicamba residues in or on oats. No Mexican tolerance or Codex MRL has been established for dicamba residues in or on oat forage, hay, or straw; therefore no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00023687. 00028252.

References (not used):

[The following reference(s) contain duplicate data or data that are not useful in assessing the tolerance.]

MRID(s):	00004518.	00004526.	00004527.	00004528.	00004529.
	00022468.	00022471.	00022482.	00022483.	00022538.
	00023688.	00028210.	00028217.	00028219.	00028363.
	00028401.	00055545.	00075718.	00075726.	00075728.

Discussion of the data:

N/A.

Rye forage, hay, and straw

Tolerance(s):

No tolerance has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on rye forage, hay, or straw.

Use directions and limitations:

The 4 lb/gal SC/L formulations of the dimethylamine, aminoethoxy ethanol, and potassium salts may be applied to rye grown for pasture use only. Application to pastures are permitted at rates up to 8 lb ae/A; details of specific PHIs and pregrazing intervals with regard to lactating animals may be found in the Grasses, Pasture and Rangelands section. It should be noted that dicamba may be phytotoxic to rye if applied at rates in excess of those specified for annual weeds (0.75 lb ae/A). Therefore, assuming a maximum rate of 0.75 lb ae/A, the following restrictions are in effect for this use: (i) a 7-day pregrazing interval and a 37-day PHI for application at up to 0.5 lb ae/A; and (ii) a 21-day pregrazing interval and a 51-day PHI for application at rates up to 0.75 lb ae/A. There is no pregrazing interval for non-lactating animals. A 30-day pre-slaughter interval has been established for meat animals.

Conclusions:

No tolerance has been established for the combined residues of dicamba and its 5-hydroxy metabolite in or on rye forage or hay However, we note that registered use on pastures includes rye grown for pasture and that residues could occur in or on forage and hay following these uses. There are no data available reflecting these uses. No additional data are required, however, since the data requested for wheat forage, hay, and straw will, by translation, satisfy the requirements for data on rye. The following is required:

- The registrant must amend appropriate product labels to specify a maximum application rate to rye grown for pasture only.

- Tolerances must be proposed for the combined residues of dicamba and its 5-hydroxy metabolite in or on rye forage and hay and appropriate supporting residue data must be submitted.

There is no Canadian or Mexican tolerance or Codex MRL for residues of dicamba in or on rye; therefore, no questions of compatibility exist with respect to the Codex MRL.

References (used):

N/A.

Discussion of the data:

N/A.

Sorghum forage, fodder, and hay

Tolerance(s):

Tolerances of 3 ppm have been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on sorghum forage and sorghum fodder [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L formulation of the dimethylamine salt is registered for use as a preplant, preemergence or postemergence, broadcast or banded application to sorghum at 0.25 lb ae/A. Applications may be made before the plants are 15 inches tall. The 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt may be applied as either a preplant or postemergence treatment at the same rate, at least 15 days prior to planting or not until plants are in the three-leaf stage but before they are 15 inches tall. The 4 lb/gal SC/L formulation of the potassium salt is also registered for postemergence application only and may be applied at the same rate. Applications may be made in 5-50 gallons of finished spray per acre using ground equipment or in 3-10 gallons/acre aerially. Only one application per growing season is permitted and a 30-day PHI is in effect. Grazing or harvesting for livestock feed prior to crop maturity is prohibited.

Preharvest broadcast application is permitted in OK, and TX, and in IA, IL, IN, KS, MI, MO, NE, and OH (EPA SLN No. IN800012) using the 4 lb/gal SC/L formulation of the dimethylamine salt at 0.25 lb ae/A. In addition, preharvest application is permitted in OK and TX using the 2-(2-aminoethoxy) ethanol and potassium salts. Applications are to be made after the plants have reached the soft dough stage. In IN, applications may be from September 15 until the first killing frost.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data satisfy data requirements pertaining to the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum forage and sorghum fodder. No additional data were

submitted. However, no data are available reflecting postemergence aerial application or registered preharvest application. The following additional data are required:

- Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum forage and fodder, following a single postemergence broadcast application of a representative formulation at a maximum rate of 0.25 lb ae/A using ground or aerial equipment in separate tests according to label directions. Application must be at or about the time when plants are 15 inches tall and harvested 30 days later. Tests must be conducted in the states of KS(51%) and TX(18%) since these states accounted for ca. 70% of the 1987 U.S. sorghum forage production (1982 Census of Agriculture, Vol. 1, Part 51, p. 313).

- Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum forage and fodder, following a single preharvest broadcast application of a representative formulation at the maximum rate of 0.25 lb ae/A using ground and aerial equipment in separate tests according to label directions. Applications must be made after the plant has reached the soft dough stage. Tests must be conducted in OK or TX; IL, IN, or MI; and KS, MO, or NE, in order to adequately represent the regions in which this use is permitted.

- A tolerance must be proposed and supporting residue data submitted for sorghum hay. Alternatively, a feeding restriction may be imposed and the label amended.

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in or on sorghum forage or fodder; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00022622. 00078448.

References (not used):

[The following reference(s) contain duplicate data or data that is not useful in assessing the tolerance.]

MRID(s): 00028216. 00028403. 00030695. 00068062. 00073273. 00075719. 00075727. 00075729.

Discussion of the data:

N/A.

Wheat forage, hay and straw

Tolerance(s):

A tolerance of 0.5 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on wheat straw [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L dimethylamine salt, 4 lb/gal SC/L 2-(2-aminoethoxy) ethanol salt, 4 lb/gal SC/L potassium salt, and 2 lb/gal SC/L sodium salt formulations are registered for preplant, preemergence, or postemergence, broadcast application to wheat 0.125 lb ae/A. Treatments may be made in 5-20 gallons of water/acre using ground equipment or 3-5 gallons aerially. Postemergence application must be made prior to the jointing stage for fall-seeded wheat and before the five-leaf stage for spring-seeded wheat. Grazing or harvesting for livestock feed prior to crop maturity is prohibited.

The above formulations, with the exception of the sodium salt, are also registered for a single preplant broadcast application in ID, MT, NV, OR, UT, and WA at 4-6 lb ae/A, 30 days prior to planting wheat. Only one application per year is permitted.

The 4 lb/gal SC/L formulations of the dimethylamine, aminoethoxy ethanol, and potassium salts may be applied to wheat grown for pasture use only. Application to pastures are permitted at rates up to 8 lb ae/A; details of specific PHIs and pregrazing intervals with regard to lactating animals may be found in the Grasses, Pasture and Rangelands section. It should be noted that dicamba may be phytotoxic to wheat if applied at rates in excess of those specified for annual weeds (0.75 lb ae/A). Therefore, assuming a maximum rate of 0.75 lb ae/A, the following restrictions are in effect for this use: (i) a 7-day pregrazing interval and a 37-day PHI for application at up to 0.5 lb ae/A; and (ii) a 21-day pregrazing interval and a 51-day PHI for application at rates up to 0.75 lb ae/A. There is no pregrazing interval for non-lactating animals. A 30-day pre-slaughter interval has been established for meat animals.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data supported the established tolerance for combined residues of dicamba and its metabolite 3,6-dichloro-5-

hydroxy-o-anisic acid in or on wheat straw. No additional data was required. Additional data were submitted (1986; MRID 00162206) depicting combined dicamba residues resulting from application of the dimethylamine and 2-(2-aminoethoxy) ethanol salts on wheat. However, we note that registered use on pastures includes wheat grown for pasture and that residues could occur in or on forage and hay following these uses. There are no data available reflecting these uses. In addition, tolerances and residue data are needed for wheat forage and hay. The following data are therefore required:

- Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on wheat forage and hay harvested following postemergence broadcast application of a representative formulation at 0.5 and 0.75 lb ae/A. Forage must be harvested 7 days following application at 0.5 lb ae/A and 21 days following application at 0.75 lb ae/A and hay must be harvested 37 and 51 days posttreatment, respectively. Alternatively, the data must reflect the rate(s), PHI(s), and pregrazing intervals proposed by the registrant for this use on amended product labels. Based on these required residue data, tolerances must be proposed for the combined residues of dicamba and its 5-hydroxy metabolite in or on wheat forage and hay. The tests must be conducted in the states of CO(5%), KS(17%), MT(7%), ND(13%), OK(6%), TX(5%), and WA(5%), since these states accounted for ca 60% of the 1987 U.S. wheat forage and hay production (USDA Crop Database, Ag. Statistics Board, NASS, Jan. 1988).

- The registrant must amend appropriate product labels to specify a maximum application rate to wheat grown for pasture only.

A Canadian tolerance of 0.1 ppm has been established for dicamba residues in or on wheat. No Mexican tolerance or Codex MRL has been established; therefore no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00004541. 00004566. 00023687. 00025394. 00055662. 00162206*.

References (not used):

[The following reference(s) contain duplicate data or data that are not useful in assessing the tolerance.]

MRID(s): 00004519. 00004520. 00004521. 00004522. 00004523. 00004524. 00004620. 00022470. 00022531. 00023687.

00023688.	00023701.	00028206.	00028220.	00028252.
00028363.	00028375.	00028399.	00051213.	00055545.
00068062.	00075716.	00075718.	00075726.	00075727.
00075728.	00126684.			

Discussion of the data:

Sandoz Crop Protection Corp. (1986; MRID 00162206) submitted data from five tests conducted in CO(1), MT(1), ND(2) and SD(1) depicting residues of dicamba and its 5-hydroxy-metabolite in or on wheat straw following a single postemergence application of the 4 lb/gal SC/L dimethylamine salt and the 2-(2-aminoethoxy) ethanol salt formulations. A total of 10 samples of wheat straw were harvested 20-84 days following a single postemergence ground application at 0.125 lb ae/A (1x the maximum registered use rate) in 7-20 gallons of water. Combined residues were <0.02 (nondetectable; <0.01 ppm for each dicamba and 5-hydroxy dicamba) to 0.078 ppm for the DMA salt and <0.02 (nondetectable) to 0.130 ppm for the ethanol salt. Apparent combined residues in the five untreated samples were <0.02 ppm (nondetectable). The samples were analyzed using method AM-0691A; a GLC/EC method with a limit of detection of 0.01 ppm each for dicamba and its 5-hydroxy-metabolite. Recovery was 82-88% from samples fortified with each compound at 0.05 ppm. Samples were stored at -20 F prior to analysis for an unspecified length of time.

Additional data available, yet not discussed in the previous science chapter, include tests performed from 1968 to 1975 (1972-1976; MRIDs 00004541, 00004566, 00023687, 00025394 and 00055662). A total of 49 samples were analyzed following postemergence ground and air treatments at 1-4x the maximum use rate of both the dimethylamine salt and the sodium salt. Combined residues of dicamba and 5-hydroxy dicamba in or on wheat straw were <0.02 (nondetectable) to 0.23 ppm. One study (1970; MRID 00028398) depicts combined residues of dicamba and 5-hydroxy dicamba in or on wheat as a rotational crop following application to fallow or stubble at rates of 1.3-2.6x, one month subsequent to treatment. Combined residues in or on two straw samples were <0.18 (<0.04 ppm for the parent compound) to <0.12 ppm.

The geographic representation is adequate for wheat straw, since the states of CO(5%), MT(7%), ND(13%) and SD(5%) plus AR(2%), ID(4%), KY(1%), MN(5%), NE(4%)< OR(3%) and WA(5%) (previously submitted) along with the neighboring state of KS(17%), account for >70% of the 1987 U.S. commercial wheat production (USDA Crop Database, Jan. 1988, Ag. Statistics Board, NASS). The available data support the established tolerance for combined residues of dicamba in or on wheat straw. However, no data were submitted depicting residues in or on wheat forage or hay or data reflecting registered application to wheat grown for pasture. Additional data are required.

Grass Forage, Fodder, and Hay Group

Grasses, pasture and rangeland

Tolerance(s):

Tolerances of 40 ppm have been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on grass hay, pasture grasses and rangeland grasses [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L formulations of the dimethylamine and potassium salts of dicamba are registered for postemergence applications to pasture and rangeland grasses at 0.25-8 lb ae/A. Repeat applications are permitted and no more than 8 lb ae/A may be applied per season. Applications are made in 5-600 gal/A using ground equipment and in 3-40 gal/A using aerial equipment; an oil-water emulsion may be used as a carrier. Spot treatments are permitted using a diluted spray at no specified rate. A 30-day pre-slaughter interval has been established. Application may not be made after heading. The 10.15% EC formulation of the dimethylamine salt is registered for postemergence application made before the boot stage at 0.25-0.5 gal of product (ca. 0.25-0.5 lb ae)/A; this use is limited to CO, NM, OK, and TX.

The 0.918 lb/gal SC/L formulation of the dimethylamine salt is registered for use in the fall after burning, within 3-14 days after the first irrigation at 1.84-3.67 lb ae/A in 100-200 gal/A.

The 4 lb/gal SC/L formulations of the dimethylamine and potassium salts are registered for use in pastures and rangeland for tree-injection treatments at 1 mL of product per tree, stump or girdling treatment at 1 part product to 1-3 parts water.

The 5.9% G formulation of dicamba acid is registered for postemergence application to pasture and rangeland at 1.2-11.8 lb ae/A. Grasses may be grazed or harvested for lactating animals 60 days after application. A 30-day preslaughter interval is in effect for grazing of meat animals. The 11.8% P/T formulation is registered for spot treatment for control of trees and bushes at 0.33 tbls product/inch of trunk diameter or 1 tbls of product/4 feet of canopy diameter.

Postemergence application to grasses grown for seed is permitted using the 0.918 lb/gal SC/L formulation of the dimethylamine salt at 0.23-0.92 lb ae/A, the 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt at 0.25-1 lb ae/A, and the 2 lb/gal EC formulation of the sodium salt at 0.06-5 lb ae/A. Applications

are made after the three- to five-leaf stage in 5-40 gal/A. Post-harvest applications may be made after burning and 3-14 days after the first irrigation using the 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt at 2-4 lb ae/A and the 2 lb/gal EC formulation of the sodium salt at 1-2 lb ae/A.

Bentgrass, bluegrass, fescue, Kentucky bluegrass, and ryegrass grown for seed may be given postemergence broadcast applications of the 4 lb/gal SC/L formulations of the 2-(2-aminoethoxy)ethanol, dimethylamine, and potassium salts of dicamba at 0.25-0.5 lb ae/A on seedling grass (after the 3- to 5-leaf stage) and 0.25-1 lb ae/A on established crops. Application may not be made after jointing. A 30-day pre-slaughter interval has been established; there is no pregrazing restriction for nonlactating animals.

Table 2. Restrictions pertaining to lactating dairy animals and pasture applications. [There is no restriction on grazing of nonlactating animals.]

Rate (lb ae/A)	Pregrazing interval (days)	PHI (days)
0.5	7	37
1	21	51
2	40	70
8	60	90

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 did not require additional data pertaining to residues of dicamba and its 5-hydroxy metabolite in or on pasture or rangeland grasses or grass hay. It should be noted, however, that pregrazing intervals are inappropriate for application to rangeland. Furthermore, for application to pasture grasses, there are no restrictions on grazing or harvesting hay for nonlactating animals (this includes meat animals). Therefore, the established tolerances for residues in or on rangeland grasses and grass hay must be assessed on the basis of residues in or on grass harvested on the day of treatment at 1x the maximum registered rate. The available data (1966-1974; MRIDs 00028173, 00028200, 00028267, and 00028268) indicate that combined residues exceeded 1300 ppm in or on samples of grass and grass hay harvested 0-3 days following treatment at 10 lb ae/A (1.25x) and numerous samples treated at <1x bore combined residues exceeding the established tolerances. The registrant needs to propose revisions in the tolerance levels and submit supporting residue data. In addition, the Agency has concluded that preslaughter intervals longer than 3 days are considered impractical (letter by S. Schatzow dated 2/11/86) and, therefore, all product labels

bearing a 30-day preslaughter interval must be amended. We note that, due to the restrictions on grazing and harvesting for lactating animals, residues in or on grass and hay fed to dairy animals are not expected to exceed 40 ppm.

The following additional data are required:

- The registrant must propose revisions in the established tolerances for combined residues of dicamba and its 5-hydroxy metabolite in or on pasture grass, rangeland grass, and grass hay and provide appropriate supporting residue data. It should be noted that any increase in tolerance level is dependent upon toxicological considerations.

- The registrant must amend all pertinent product labels to reflect an appropriate preslaughter interval of 1-3 days for meat animals.

A Canadian tolerance of 0.1 ppm has been established for residues of dicamba in or on pasture grass. There is no Mexican tolerance or Codex MRL; therefore, there are no questions of compatibility with respect to the Codex MRL.

References (used):

MRID(s): 00028173. 00028200. 00028267. 00028268.

Discussion of the data:

N/A.

Miscellaneous commodities Group

Asparagus

Tolerance(s):

A tolerance of 3 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on asparagus [40 CFR §180.227(a)].

Use directions and limitations:

The 4 lb/gal SC/L formulation of the dimethylamine salt, the 4 lb/gal SC/L formulation of the 2-(2-aminoethoxy) ethanol salt and the 4 lb/gal SC/L formulation of the potassium salt are

registered for postemergence, direct spray application at 0.5 lb ae/A. The 2 lb/gal SC/L formulation of the sodium salt is registered for use in a similar manner at 0.25 lb ae/A. These uses are limited to the states of CA, OR and WA. Applications may be made in 40-60 gallons of water per acre immediately after the first cutting but at least 24 hours before the next cutting. Only one application per growing season is permitted.

Conclusions:

Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1970; MRID 00025338) support the established tolerance for combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid following the application of the 4 lb/gal SC/L formulation of the dimethylamine salt. No additional data were required and no new data were submitted. However, we note that the data reflecting application at 1x the maximum rate and a 1-day posttreatment interval consist of three analyses of only a single sample. In recent years, Agency interpretation of existing guidelines concerning number of samples has become stricter. The following additional data are required:

- Data depicting the dicamba residues of concern in or on asparagus spears harvested 1 day following a single postemergence direct spray application of a representative 4 lb/gal SC/L formulation at 0.5 lb ae/A. The tests must be conducted in CA(49%) or WA(35%), since these states accounted for ca. 80% of the 1986 U.S asparagus production (Vegetables, Ag. Statistics Board, NASS, USDA, June 1987, p. 18).

Note to the PM: We recommend that the entry for asparagus in 40 CFR 180.227(a) be transferred to 40 CFR 180.227(b), since the available metabolism data indicate that the terminal residues in asparagus are dicamba and DCHBA and that the 5-hydroxy metabolite is not found.

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in or on asparagus; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00025338.

References (not used):

[The following reference(s) contain duplicate data or data that are not useful in assessing the tolerance.]

MRID(s): 00025341. 00028305.

Discussion of the data:

N/A.

Sugarcane

Tolerance(s):

Tolerances of 0.1 ppm have been established for the combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on sugarcane, sugarcane forage, and sugarcane fodder [40 CFR §180.227(a)].

Food and feed additive tolerances of 2 ppm each have been established for the same residues in sugarcane molasses [40 CFR §185.1800 and 40 CFR §186.1800, formerly 21 CFR §193.465 and 21 CFR §561.427, respectively].

Use directions and limitations:

The 4 lbs/gal SC/L dimethylamine salt and the 4 lb/gal 2-(2-aminoethoxy) ethanol salt formulations are registered for use as a postemergence directed spray on sugarcane at 3 lbs ae/A in 5-50 gallons of water/A using ground equipment or 3-10 gallons of water/A using aerial equipment. Use of 4 lb/gal SC/L potassium salt formulation is limited to the state of HI and may be applied at 2 lb ae/A. Multiple applications may be made any time after weeds emerge but before the close-in stage not to exceed 3 lbs ae per treated acre during one growing season.

Conclusions:

Dicamba Guidance Document dated September 30, 1983 concluded that the available data (1975-1980; MRIDs 00030701, 00079738 and 00149626) supported the established tolerances for combined residues of dicamba and its metabolite 3,6-dichloro-5-hydroxy-o-anisic acid in or on sugarcane, sugarcane forage and fodder, and sugarcane molasses following the application of the 4 lb/gal SC/L formulation of the dimethylamine salt. No additional data were required. Data from the processing study reviewed for the Guidance Document (1980; MRID 00149626) indicate that residues of dicamba and its hydroxy-metabolite concentrate up to 15x in sugarcane molasses from fortified raw chopped cane and that no concentration occurred in raw sugar or bagasse; the present 2 ppm food additive tolerance for combined residues in molasses was subsequently established based on these data. It should be noted that, according to the Residue Chemistry Pesticide Assessment Guidelines, Subdivision O, processing studies using fortified samples are unacceptable, particularly for systemic pesticides.

Additional data (1980; MRID 00030701) are available reflecting processing of field-treated cane samples bearing nondetectable residues (<0.01 ppm); two samples of bagasse from this study bore detectable residues of 0.01-0.02 ppm, indicating a likelihood of residue concentration in this commodity. Thus, no adequate processing data are available and there is a discrepancy as to the potential for residue concentration in bagasse.

The following additional data are required:

- A processing study depicting the combined residues of dicamba residues in molasses, refined sugar, bagasse processed from sugarcane bearing measurable, weathered residues. If residues concentrate in refined sugar or bagasse, an appropriate food/feed additive tolerance must be proposed. The established food additive tolerance for sugarcane molasses will be reassessed following evaluation of these data.

Note to PM: We recommend that the tolerance entry for sugarcane fodder be deleted from the 40 CFR 180.227(a), since it is not considered a raw agricultural commodity of sugarcane.

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in or on sugarcane; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00030701. 00079738. 00149626.

References (not used):

[The following reference(s) contain duplicate data or data that are not useful in assessing the tolerance.]

MRID(s): 00022655. 00057566. 00057557. 00127823. 00162206.

Discussion of the data:

N/A.

MAGNITUDE OF THE RESIDUE IN MEAT, MILK, POULTRY AND EGGS

Fat, Meat, and Meat Byproducts of Cattle, Goats, Hogs, Horses and Sheep

Tolerance(s):

Tolerances of 0.2 ppm have been established for the combined residues of dicamba and its metabolite 3,6-dichloro-2-hydroxybenzoic acid in the fat, meat and meat byproducts of cattle, goats, hogs, horses, and sheep [40 CFR §180.227(b)].

Tolerances of 1.5 ppm have been established for the combined residues of dicamba and its metabolite 3,6-dichloro-2-hydroxybenzoic acid in the kidney and liver of cattle, goats, hogs, horses and sheep [40 CFR §180.227(b)].

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data support the tolerances for combined residues of dicamba and DCHBA in the fat, meat, liver, kidney and meat byproducts of cattle, goats, hogs, horses and sheep. No additional data were required or submitted. Presently, the nature of the residue in ruminants is not adequately understood, and numerous data gaps exist concerning the magnitude of dicamba and its metabolite in feed items, including grain dust, of animals. The available data (1977; MRID 00079742) reflect feeding at levels equivalent to up to 400 ppm in the feed, less than one half the residue level of over 1,000 ppm expected in the feed item grass following registered use according to the available residue data (refer to the "Pasture and rangeland grasses" section). Additional data are required; however, the details of the data requirements will be determined following receipt of the data requested under "Qualitative Nature of the Residue in Animals" and "Magnitude of the Residue in Plants."

Since the issuance of the Guidance Document, Agency policy regarding the acceptable length of preslaughter intervals has changed and intervals longer than 3 days are now considered impractical. Therefore, the 30-day preslaughter interval established for application to pasture grasses is no longer acceptable. The registrant is instructed to amend pertinent product labels to specify a preslaughter interval of 3 days or shorter (Refer to the "Magnitude of the Residue in Plants" section).

No Canadian or Mexican tolerance or Codex MRL have been established for dicamba residues in or on animal commodities;

therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 0079742.

References (not used):

[The following reference(s) contain duplicate data or data that are not useful in assessing the tolerance.]

MRID(s): 00022485. 00028391. 00066381. 00066383. 00078448. 00079742. 00079743. 00079745.

Discussion of the data:

N/A.

Milk

Tolerance(s):

A tolerance of 0.3 ppm has been established for the combined residues of dicamba and its metabolite 3,6-dichloro-2-hydroxybenzoic acid in milk [40 CFR §180.227(b)].

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the available data support the tolerances for combined residues of dicamba and DCHBA in milk. No additional data were required or submitted. Presently, the nature of the residue in ruminants is not adequately understood, and numerous data gaps exist concerning the magnitude of dicamba and DCHBA in feed items, including grain dust. Therefore, the expected dietary intakes for dairy cattle will not be calculated. If the required animal metabolism studies reveal additional metabolites of toxicological concern, additional studies may be required.

The available data (1982; 00116671) indicate that combined residues in milk are unlikely to exceed 0.3 ppm resulting from the feeding of dicamba to dairy cattle at rates of 40-200 ppm in the diet. Although the available residue data indicate that the established tolerances of 40 ppm for residues in or on pasture and rangeland grass and grass hay are too low, residue data reflecting the rates, pregrazing intervals and PHIs specified for lactating animals, indicate that the maximum dietary residue level is not expected to exceed 40 ppm.

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in milk; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00116671.

References (not used):

[The following reference(s) contains data that are not useful in assessing the tolerance.]

MRID(s): 00022486.

Discussion of the data:

N/A.

Poultry and Eggs

Tolerance(s):

No tolerances have been established for residues of dicamba and its metabolite, 3,6-dichloro-2-hydroxybenzoic acid in poultry tissues or eggs.

Conclusions:

The Dicamba Guidance Document dated September 30, 1983 concluded that the data pertaining to residues in poultry products were invalid and that the poultry studies needed to be repeated. Additional data depicting the transfer of dicamba residues of concern to poultry commodities were required. A poultry feeding study has been submitted (1984; MRID 00148127) reflecting feeding at rates equivalent to 2, 6, and 20 ppm in the diet; the data were discussed in an EPA memorandum by M. Firestone (dated 8/15/85, located in the correspondence file for PP#3F2794). The adequacy of this study and the appropriate tolerance levels, if any, for residues in or on poultry tissues and eggs will be determined following receipt of the requested poultry metabolism study (refer to "Qualitative Nature of the Residue in Animals" for details of data requirements).

No Canadian or Mexican tolerance or Codex MRL has been established for dicamba residues in or on poultry tissues or eggs; therefore, no question of compatibility exists with respect to the Codex MRL.

References (used):

MRID(s): 00148127*.

References (not used):

[The following reference(s) do not contain useful data.]

MRID(s): 00085403. 00146369.

REGULATORY INCIDENTS

USDA Food Inspection and Safety Service does not monitor residue data on dicamba as part of the 1988 National Residue Program Plan.

The Dietary Exposure Branch has requested and received FDA surveillance monitoring data (FY78-FY88) and Total Diet Study data (1982-1986) for dicamba. If needed for use in dietary exposure assessment, these data will be summarized in an addendum to this chapter.

TOLERANCE REASSESSMENT SUMMARY

The qualitative nature of the residue in animals is not adequately understood. Additional data are required for this topic, residue analytical methods, and storage stability. It should be noted that the conclusions stated in this SRR regarding the adequacy of the established tolerances may be changed on receipt of the required analytical method and storage stability data.

The available data support the established tolerances for the combined residues of dicamba and its 5-hydroxy metabolite in or on barley grain, corn grain, corn forage, corn fodder, wheat grain, sugarcane, sugarcane forage, and sugarcane fodder, and for the combined residues of dicamba and its DCHBA metabolite in or on soybeans, soybean forage, and soybean hay.

The available data indicate that the established tolerances for the combined residues of dicamba and its 5-hydroxy metabolite in or on pasture and rangeland grasses and grass hay are too low. Tolerance revisions and/or amended use directions must be proposed for these commodities and appropriate supporting residue data submitted.

Additional data are required to assess the established tolerances for the combined residues of dicamba and its 5-hydroxy metabolite in or on asparagus, sorghum grain, sorghum forage, sorghum fodder and sorghum hay.

The data requested for wheat grain and wheat forage and hay may by translation be used to fulfill data requirements for oat grain millet grain and the forage and fodder of barley, millet, and oats. Data for wheat straw will be translated to millet and oat straw.

Processing studies are needed for corn grain, sorghum grain, and sugarcane. The adequacy of the established food and feed additive tolerances for residues in sugarcane molasses will be assessed following receipt of the requested sugarcane processing study. Data are needed depicting residues in grain dust from soybeans and wheat grain; the data on wheat grain dust may by translation fulfill data requirements for grain dust of barley, corn, millet and oat grain. Based on a concentration factor of 2x observed in a processing study of wheat grain, food/feed additive tolerances must be proposed for residues in the milled products (except flour) of barley, millet, oats, and wheat.

Tolerances must be proposed and appropriate data submitted depicting residues in or on forage and hay of barley, oats, rye, and wheat resulting from registered use of dicamba on small grains grown for pasture use only. In addition, the rate at which this use is permitted needs to be clarified, since the maximum rate listed on the product labels is intended for application to established pastures and rangeland and is likely to be phytotoxic to small grain crops.

Following receipt of the data requested from animal metabolism studies, crop field trials, and processing studies, the adequacy of the established tolerances for residues in milk and the meat, fat, kidney, liver, and meat by-products of cattle, goats, hogs, horses, and sheep will be assessed and the need for tolerances for residues in poultry and eggs will be determined.

The 30-day preslaughter interval listed on product labels for grazing of meat animals is considered inappropriate; the labels must be amended to reflect preslaughter intervals of 3 days or shorter.

It is recommended that the 40 CFR 180.227(a) entry for millet straw be deleted, since millet straw is not considered a raw agricultural commodity.

It is recommended that the entry for asparagus in 40 CFR 180.227(a) be transferred to 40 CFR 180.227(b), since the available data indicate that the terminal residues in asparagus are dicamba and DCHBA and that the 5-hydroxy metabolite is not found.

MASTER RECORD IDENTIFICATION NUMBERS

The following references were obtained from a Guideline Sequence Bibliography conducted March 21, 1989 for all documents on dicamba (Shaughnessy Codes 029801, 029802, 029803, 029804, and 029806) in the Pesticide Management System (PDMS).

References (used):

00004541 Velsicol Chemical Corporation (1974) Summary of Mondak Residue Studies--Winter Wheat. (Unpublished study including Velsicol Report #147 and #150, received Dec 11, 1974 under 876-45; CDL:003548-A)

00004566 Velsicol Chemical Corporation (1972) Wheat (Fall Seeded): Report No. 123. (Unpublished study received May 21, 1973 under 876-45; prepared in cooperation with Northwestern Agricultural Research Center; CDL:021027-A)

00015636 Suzuki, H.K.; Whitacre, D.M.; Anderson, R.F. (1975) Laboratory Report: Residue Project 74-1-D; Banvel(R)--Corn: Report No. 163. (Unpublished study received Mar 5, 1979 under 876-25; prepared in cooperation with Cal-Laboratories, Inc. and ABC Laboratories, Inc., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:237957-A)

00015637 Suzuki, H.K.; Whitacre, D.M.; Anderson, R.F. (1976) Laboratory Report: Residue Project 75-1-D; Banvel (R): Corn--Harvest Aid: Report No. 171. (Unpublished study received Mar 5, 1979 under 876-25; prepared in cooperation with IRDC and ABC Laboratories, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:237957-B)

00015640 Suzuki, H.K.; Whitacre, D.M.; Nickell, L.G. (1978) Laboratory Report: Residue Project 77-1-D; Banvel--Dual--Corn: Report No. 191. (Unpublished study received Mar 5, 1979 under 876-25; prepared in cooperation with Craven Laboratories, Inc., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:237957-E)

00015641 Suzuki, H.K.; Whitacre, D.M.; Anderson, R.F. (1976) Laboratory Report: Residue Project 75-1-D; Banvel(R)--Corn (No-Till): Report No. 173. (Unpublished study received Mar 5, 1979 under 876-25; prepared in cooperation with Cal-Laboratories, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:237957-F)

00015642 Suzuki, H.K.; Whitacre, D.M.; Anderson, R.F. (1975) Laboratory Report: Residue Project 74-1-D; Banvel(R)--Bladex--Corn: Report No. 164. (Unpublished study received Mar 5, 1979 under 876-25; prepared in cooperation with Cal-Laboratories, Inc., Purdue Univ. and Univ. of Wisconsin, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:237957-G)

00015786 Chamberlain, E.; Taylor, T.D. (1978) Metolachlor, Dual(R) 8E; Dicamba, Banvel: AG-A No. 4865 I, II. (Unpublished study received Mar 16, 1979 under 100-583; submitted by Ciba-Geigy Corp., Greensboro, N.C.; CDL:237818-E)

00016435 Houseworth, L.D. (1977) Residues of Metolachlor and Dicamba in or on Corn Grain Resulting from Preemergence Tank Mix Applications: Report No. ABR-77071. Summary of studies 232192-B through 232192-D. (Unpublished study received Nov 10, 1977 under 100-EX-59; submitted by Ciba-Geigy Corp., Greensboro, N.C.; CDL:232192-A)

00016436 Chamberlain, E.; Coan, R.M. (1977) Residue Report: Field Corn: AG-A No. 4253 II. (Unpublished study received Nov 10, 1977 under 100-EX-59; prepared in cooperation with Velsicol Chemical Corp., submitted by Ciba-Geigy Corp., Greensboro, N.C.; CDL:232192-B)

00016437 Chamberlain, E.; Kern, C.L. (1977) Residue Report: Field Corn: AG-A No. 4264 II. (Unpublished study received Nov 10, 1977 under 100-EX-59; prepared in cooperation with Velsicol Chemical Corp. and Craven Laboratories, submitted by Ciba-Geigy Corp., Greensboro, N.C.; CDL:232192-C)

00016438 Chamberlain, E.; Taylor, T.D. (1977) Residue Report: Field Corn: AG-A No. 4270 III. (Unpublished study received Nov 10, 1977 under 100-EX-59; prepared in cooperation with Velsicol Chemical Corp. and Craven Laboratories, submitted by Ciba-Geigy Corp., Greensboro, N.C.; CDL:232192-D)

00022612 Fletchall, O.H.; Rues, O.G.; Probst, N.; et al. (1970) Residue Results: Summary. (Unpublished study received Jun 10, 1971 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:005045-I)

00022613 Suzuki, H.K.; Jolliffe, V.A.; Polen, P.B.; et al. (1970) Residue Project 70-6H: Banvel-Atrazine--Corn: Report No. 29. (Unpublished study received May 19, 1970 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:004523-B)

00022618 Staniforth, D.; Fletchall, O.H.; Stroube, E.; et al. (1965) [Efficacy Study of Dicamba and other Herbicides on Corn]. (Unpublished study received Mar 11, 1965 under 876-25; prepared in cooperation with Iowa State Univ. and others, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:022213-A)

00022622 Woofter, D.; Appleby, A.P.; Watson, V.H.; et al. (1972) [Chemical Sprays on Corn, Sorghum and Wheat]. (Unpublished study received Jan 3, 1973 under 876-25; prepared in cooperation with Oregon State Univ. and others, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:005052-C)

00022745 Leonard, O.A.; lider, L.A.; Glenn, R.K. (1965) Absorption and Translocation of Herbicides by Thompson Seedless (Sultanina) Grape, Vitis vinifera L. (Unpublished study received Aug 30, 1965 under 6F0466; prepared by Univ. of California--Davis, Depts. of Botany and Viticulture and Enology, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:090517-AT)

00022753 Quinn, R.M.; Bingham, W. (1965) Translocation of Dicamba in Herbaceous Plants. (Unpublished study received Aug 30, 1965 under 6F0466; prepared by Big Sandy High School (Montana) in cooperation with Virginia Polytechnic Institute and State Univ., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:090517-BG)

00023584 Aschoff, J.; Shephard, D.; Shephard, D.; et al. (1973) Residue Results. (Unpublished study received Feb 15, 1974 under 876-25; prepared in cooperation with Purdue Univ. and others, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:022193-D)

00023684 Velsicol Chemical Company (1965) [Corn: Banvel-D Residue (Uncorrected Basis) Preemergent Treatment]: TSR No. F-35. (Unpublished study including TSR nos. F-45, F-43, F-43A..., received Mar 11, 1965 under 876-25; CDL:120179-A)

00023687 Rydrych, D.; Behrens, R.; Wallace, K.; et al. (1972) [Residues from Various Chemicals on Grains]. (Unpublished study received Jan 3, 1973 under unknown admin. no.; prepared in cooperation with Univ. of Minnesota and others, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:120182-A)

00025330 Suzuki, H.K.; Fenster, C.R. (1976) Dicamba: Residue Tolerance Petition--Proso Millet. (Unpublished study received Jan 24, 1979 under 9E2166; prepared in cooperation with Univ. of Nebraska, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:097773-A)

00025338 Klausen-Rogers, G.; Renfrow, J.; Slater, L.; et al. (1970) Residue Results: [Dicamba]. (Unpublished study received Jun 15, 1973 under 1F1131; prepared in cooperation with Del Monte Corp. and others, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:090907-F)

00025344 Diaz, L.I.; Schwemmer, B.A. (1973) Radiotracer Study of Dicamba on Asparagus: Report No. 40400, No. 124. (Unpublished study received Jun 15, 1973 under 1F1131; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:090907-N)

00025364 Bodnarchuk, D.; Laporta, M.; Potts, C.; et al. (1975) Summary--Prowl and Banvel--Residues in Corn Plants. (Unpublished study received Dec 23, 1975 under 241-243; submitted by American Cyanamid Co., Princeton, N.J.; CDL:223338-A)

00025383 Suzuki, H.K.; Behrens, R.; Kilmer, D. (1975) Residue Chemistry: [Dicamba]. (Unpublished study including report no. 404000, nos. 174, 176 and 179, received Nov 18, 1976 under 876-255; prepared in cooperation with International Research and Development Corp. and Univ. of Wisconsin, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:226930-A)

00025394 Rydrich, D.; Wallace, K.; Beck, B.; et al. (1976) Residue Results: Banvel plus Bromoxynil plus MCPA Tank Mix: Summary. (Unpublished study received Feb 18, 1976 under 876-25; prepared in cooperation with Oregon State Univ., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:225197-C)

00028173 Hoffman, C.; Haas, R.; Criswell, T.; et al. (1970) Grass: Project No. 404000. (Unpublished study received Jun 15, 1970 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:004524-D)

00028200 Tullos, B.; Martin, L.; Morse, R.; et al. (1975) Weed-master Herbicide Residue Data. (Unpublished study received Oct 2, 1975 under 876-203; prepared in cooperation with Kerr Foundation and others, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:195015-A)

00028252 Velsicol Chemical Corporation (1967) Residue Data: Small Grains. (Unpublished study received Jan 3, 1968 under 8F0666; CDL:091168-R)

00028263 Velsicol Chemical Corporation (1967) Determination of Residue of Dicamba and 5-Hydroxy Dicamba. Undated method AM 0268A; undated method addendum to AM 0268A entitled: Determination of Residues of 3,5-Dichloro-o-anisic acid. (Unpublished study received Jan 5, 1968 under 8F0725; CDL:091252-V)

00028267 Velsicol Chemical Corporation (1966) Summary Data Sheet--Residue Dissipation Study. (Unpublished study received Jan 5, 1968 under 8F0725; CDL:091252-AD)

00028268 Velsicol Chemical Corporation (1967) Banvel-D Treated Grass: Summary of Residue Data: Report 404000, No. 6. (Unpublished study including report 16-166-04, nos. 1-3, received Jan 5, 1968 under 8F0725; prepared in cooperation with Texas A & M Univ., Dept. of Range Science; CDL:091252-AE)

00028269 Velsicol Chemical Corporation (1966) Field Corn Banvel(R)D Residue (Uncorrected Basis) Preemergence Treatment. (Unpublished study received Feb 24, 1966 under unknown admin. no.; CDL:120183-A)

00028398 Collins, R.L.; Appleby, A.; Baldridge, D.; et al. (1970) Summary of Dicamba Spot Treatments for Perennial Weed Control in Cropland Rotated to Wheat: Pacific Northwest States. (Unpublished study including published data, received Jul 13, 1970 under 876-25; prepared in cooperation with Oregon State Univ., Pendleton Branch Experiment Station and others, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:126372-B)

00030701 Suzuki, H.K.; Whitacre, D.M.; Boudreaux, H.; et al. (1980) Weedmaster(R)Herbicide on Sugarcane: Residue Data and Processing Studies. (Unpublished study received Apr 12, 1980 under 876-203; prepared in cooperation with International Research & Development Corp. and T. Lanaux & Sons, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:242414-B)

00036921 Broadhurst, N.A.; Montgomery, M.L.; Freed, V.H. (1966) Metabolism of 2-Methoxy-3,6-dichlorobenzoic acid (Dicamba) by wheat and bluegrass plants. Journal of Agricultural and Food Chemistry 14(6):585-588. (Also In unpublished submission received Jan 3, 1968 under 8F0666; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:091168-V)

00055662 Suzuki, H.K.; Whitacre, D.M.; Fraase, E.; et al. (1975) Summary: Residues of Dicamba and 2,4-D on Fall Wheat. Includes method dated Oct 30, 1975. (Unpublished study including report 404000, nos. 156 and 162, received Nov 11, 1976 under 876-44; prepared in cooperation with ABC Labs and International Research and Development Corp., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:24320-A)

00075715 Velsicol Chemical Corporation (1981) [Residues in Corn]. Includes undated method AM-0691. (Compilation, unpublished study received Jun 12, 1981 under 876-25; CDL:245471-B)

u00075729 Colorado (1977) [Banvel and Dicamba in Crops and Soil]. (Compilation; unpublished study received Jun 22, 1981 under CO 81/11; CDL:245581-F)

00077779 Oehler, D.D.; Ivie, G.W. (1980) Metabolic fate of the herbicide dicamba in a lactating cow. Journal of Agricultural and Food Chemistry 28(4):685-689. (Also In unpublished submission received Apr 20, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070028-U)

00078448 Velsicol Chemical Company (1966) General: [Dicamba]. Summary of studies 090716-I and 090716-J. (Unpublished study received Feb 14, 1967 under 7F0568; CDL:090716-H)

00079708 Hurtt, W.; Foy, C.L. (19??) Some Factors Influencing the Excretion of Foliarly-applied Dicamba and Picloram from Roots of Black Valentine Beans. Taken from: [Without title]. N.P. (Abstract 11:45). (Page xlviii only; also In unpublished submission received Aug 30, 1965 under 6F0466; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:090517-AQ)

00079736 Velsicol Chemical Corporation (1979) Determination of Dicamba and 5-Hydroxy Dicamba Residues in Vegetables, Forage Crops, Legumes, Cottonseed and Cottonseed Fractions and Grains. Method no. AM-0691 dated Jul 25, 1979. (Unpublished study received Sep 11, 1981 under 876-25; CDL:070319-B)

00079738 Velsicol Chemical Corporation (1981) Sugarcane Residue Studies. (Compilation; unpublished study received Sep 11, 1981 under 876-25; CDL:070319-D)

00079742 Gilsdorf, D.V.; Weissenburger, B. (1979) Effect of Feeding Dicamba to Dairy Cattly [sic] (Residues in Liver, Kidney, Muscle, and Fat): ADC Project #379. (Unpublished study received Sep 11, 1981 under 876-25; prepared by Analytical Development Corp., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070319-N)

00079744 Velsicol Chemical Corporation (1979) Determination of Dicamba and 3,6-Dichlorosalicylic Acid (DCSA) in Liver, Kidney, Skeletal Muscle, Adipose Tissue and Milk. Method no. AM 0685 dated May 7, 1979. (Unpublished study received Sep 11, 1981 under 876-25; CDL:070319-Q)

00079747 Butz, R.G.; Atallah, Y.H.; Kunkel, J.F.; et al. (1981) Metabolic Fate of Dicamba in Sugarcane Plants: Project No. 480068, Report No. 24. (Unpublished study received Sep 11, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070319-T)

00088172 Velsicol Chemical Corporation (1981) Discussion of Residue Data. (Compilation; unpublished study, including project nos. 414698 and 404000, received Dec 2, 1981 under 876-EX-37; CDL:246330-A)

00088173 Velsicol Chemical Corporation (1979) Determination of Dicamba and 5-Hydroxy Dicamba Residues in Vegetables, Forage Crops, Legumes, Cottonseed and Cottonseed Fractions and Grains. Method no. AM-0691 dated Jul 25, 1979. (Unpublished study received Dec 2, 1981 under 876-EX-37; CDL;246330-B)

00102944 Velsicol Chemical Corp. (1982) The Results of Tests on the Amount of Residue Remaining, Including a Description of the Analytical Method Used: [Banvel]. (Compilation; unpublished study received May 20, 1982 under 876-25; CDL:070876-A)

00102945 Butz, R.; Atallah, Y. (1982) Foliar Absorption, Metabolism and Translocation of Dicamba by Soybeans at Early Podfill and Late Senescent Stages: Report No. 480068-39. (Unpublished study received May 20, 1982 under 876-25; submitted by Velsicol Chemical Corp., Chicago, IL; CDL:070876-B)

00116671 Santos, F.; Butz, R. (1982) Dicamba Residues in Milk: Statistical Analysis. (Unpublished study received Oct 29, 1982 under 876-25; submitted by Velsicol Chemical Corp., Chicago, IL; CDL:071196-A)

00118473 Velsicol Chemical Corp. (1982) The Results of Tests on the Amount of [Banvel] Residue Remaining, Including a Description of the Analytical Method Used. (Compilation; unpublished study received Nov 23, 1982 under 876-25; CDL:071261-A)

00145248 Velsicol Chemical Corp. (1984) Foliar Absorption, Metabolism and Translocation of Dicamba; [Residue of Banvel Herbicide in Cotton and Grain Crops; Toxicology of Contaminants]. Unpublished compilation. 367 p.

00148127 Cahill, W.; Johnson, L. (1984) Determination of Dicamba Residue in Laying Hen Tissues and Eggs after a 28 Day Feeding Study: Project No. 480068. Unpublished study prepared by Velsicol Chemical Corp. 98 p.

00149626 Velsicol Chemical Corporation (1985) [Banvel Herbicide Residues in Vegetables, Peanuts and Alfalfa]. Unpublished compilation. 156 p.

00162206 Cahill, W.; Jimenez, N. (1986) Analysis of Barley, Corn, Sorghum, Sugar Cane and Wheat Samples for Dicamba and 5-Hydroxy Dicamba Residues: Project No. 480068: Report No. 88. Unpublished compilation. 68 p.

40233501 Armstrong, T.; Jimenez, N.; Cahill, W. (1987) Dicamba and 5-Hydroxy Dicamba Levels in Palm Oil: Laboratory Project I.D.: 480068-97. Unpublished compilation prepared by Monsanto Agricultural Co. in cooperation with Sandoz Crop Protection Corp. 160 p.

40663801 Jimenez, N. (1986) Analysis of Wheat and Wheat Processed Fractions for Dicamba and 5-Hydroxy Dicamba Residues: Project No. 480068: Report No. 92. Unpublished study prepared by Sandoz Crop Protection Corp. 37 p.

References (not used):

00004567 Chirchirillo, M.T.; Stagen, R. (1977) Compatibility Banvel, Bromoxinil, MCPA: Report No. 29. (Unpublished study received Nov 2, 1977 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:232171-A)

00004816 Klingman, G.C. (1966) Laboratory Determination of Precipitates Formed from Various 2,4-D Formulations with Solutions of Ammonium nitrate and Mixtures of Ammonium nitrate and Urea (Uran 30%). (Unpublished study including letter dated May 5, 1966 from B.A. Sprayberry for files, received Mar 13, 1967 under 677-245; prepared in cooperation with North Carolina State Univ., submitted by Diamond Shamrock Agricultural Chemicals, Cleveland, Ohio; CDL:133084-E)

00005568 Velsicol Chemical Corporation (1973) Banvel + Lasso + Sprayable Fluid Fertilizer. (Unpublished study received Mar 15, 1973 under 876-25; CDL:005053-A)

00015638 Anderson, D.L., Burns, J.; Chirchirillo, M.T. (1978) Laboratory Report: Compatability of Banvel 4-S with Bladex 80 WP, AAtrex 80 W.P. and Evik 80 W.P.: Report No. 39. (Unpublished study received Mar 5, 1979 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:237957-C)

00015639 Anderson, D.L.; Chirchirillo, M.T.; Lira, E.P. (1979) Laboratory Report: Banvel + Dual Compatibility Tests: Report No. 47. (Unpublished study received Mar 5, 1979 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:237957-D)

00019897 Garbrecht, T.P., Sr. (1978) Determination of Dicamba, 2,4-D, MCPA, or MCPP in Formulations by High Pressure Liquid Chromatography (HPLC). Method no. CF 78-2 dated Feb 16, 1978. (Unpublished study received Nov 6, 1979 under 538-160; submitted by O.M. Scott & Sons Co., Marysville, Ohio; CDL:241349-F)

00022448 O.M. Scott & Sons Company (1966) Summary of Results Report for Five Dry Granular Fertilizer and Vermiculite Formulations Containing Dicamba as a Replacement for MCPP. (Unpublished study received Jun 15, 1966 under 538-28; CDL:023114-A)

00022507 Velsicol Chemical Corporation (19??) Products Data Sheet: Banvel(R) D Herbicide. (Unpublished study received Aug 29, 1963 under 876-25; CDL:050236-C)

00022516 Stagen, R. (1972) B12D--W.S. B12T--W.S.: Report 407386, No. 1. (Unpublished study received May 10, 1972 under 876-176; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:005085-I)

00022536 Velsicol Chemical Corporation (19??) Terminology Used in This Petition To Identify Dicamba. (Unpublished study received on unknown date under 876-EX-12; CDL:127075-C)

00022545 Ferguson, F. (1978) Accelerated Shelf Life Study: New Fertilizer plus Dicot Weed Control: Formulation F-8481. (Unpublished study received Nov 1, 1978 under 538-33; submitted by O.M. Scott & Sons Co., Marysville, Ohio; CDL:235612-A)

00022602 Velsicol Chemical Corporation (19??) Banvel/Lasso Compatibility Studies with Various Fertilizer Solutions. (Unpublished study received Jan 3, 1973 under 876-25; CDL:005049-C)

00022614 Velsicol Chemical Corporation (1969) Stability of Stull Invert Formulations Containing Banvel and Various Other Herbicides at 0°F and 122°F. (Unpublished study received Jul 9, 1969 under 2738-56; submitted by Stull Chemical Co., San Antonio, Tex.; CDL:006092-A)

00022630 Velsicol Chemical Corporation (19??) Banvel(R) D Herbicide (Postemergence-Perennial Grass Establishment). (Unpublished study received Nov 8, 1965 under 876-25; CDL:004510-L)

00022631 Velsicol Chemical Corporation (19??) Name, Chemical Identity, and Composition of Technical Dicamba. (Unpublished study received Feb 15, 1967 under 7F0568; CDL:092856-D)

00022664 Velsicol Chemical Corporation (19??) Chlorodibenzodioxins in Technical Dicamba. (Unpublished study received May 30, 1971 under 1F1131; CDL:095119-I)

00022678 Buckner, R. (1972) Report to Velsicol Chemical Corporation: A Threshold Odor and Threshold Taste Evaluation of Banvel 4S: IBT No. T977. (Unpublished study received Aug 11, 1972 under 876-159; prepared by Industrial Bio-Test Laboratories, Inc., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:005077-B)

00022721 Stagen, R.S. (1973) 1 Lb. Banvel(R)--3 LbS. 2,4D-Dimethylamine Salt/Gal. W.S.: Report 407386, No. 3. (Unpublished study received Nov 2, 1973 under 876-203; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:009058-D)

00022741 Freed, V.H. (19??) [Chemical Properties of Banvel D]. (Unpublished study received Aug 30, 1965 under 6F0466; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:090517-AL)

00023073 Dorn, R.W. (1974) Compatibility of Bladex(R) Herbicide 4 WDS with Commercial Herbicides. (Unpublished study received Mar 28, 1975 under 201-281; submitted by Shell Chemical Co., Washington, D.C.; CDL:224001-A)

00023088 Velsicol Chemical Corporation (1961) Velsicol Banvel D: 2-Methoxy-3,6-dichlorobenzoic acid (Velsicol 58-CS-11, Compound B). Chicago, Ill.: VCC. (Bulletin no. 521-2; also In unpublished submission received Jan 26, 1962 under unknown admin. no.; CDL:119436-B)

00023109 Oregon State University (1961) Annual Report--1961. (Unpublished study received Aug 30, 1965 under 6F0466; prepared by Agricultural Experiment Station, Dept. of Agricultural Chemistry, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:090517-AM)

00023144 Dorn, R.W.; Henning, R.W.; Bellin, R.H.; et al. (1975) Formulation Studies with Bladex(R) Herbicide: Technical Progress Report No. M-38-74. (Unpublished study received Nov 16, 1976 under 201-281; submitted by Shell Chemical Co., Washington, D.C.; CDL:226837-B)

00023727 Dorn, R.W. (1974) [Compatibility of Bladex(R) Herbicide with Commercial Herbicide and Liquid Fertilizers]. (Unpublished study received Mar 28, 1975 under 201-281; submitted by Shell Chemical Co., Washington, D.C.; CDL:009627-A)

00024427 Dorn, R.W. (1974) Formulation Department Studies on Atrazine Wettable Powder and Flowable Formulations. (Unpublished study received Aug 30, 1974 under 201-375; submitted by Shell Chemical Co., Washington, D.C.; CDL:028230-Q)

00025339 Velsicol Chemical Corporation (19??) Banvel(R) Herbicide. (Unpublished study received Jun 15, 1973 under 1F1131; CDL:090907-H)

00025386 Ross, R.D.; Morrison, J.; Rounbehler, D.P.; et al. (1977) N :-Nitroso compound impurities in herbicide formulations. Journal of Agricultural and Food Chemistry 25(6):1416-1418. (Also In unpublished submission received Feb 27, 1978 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:233352-A)

00026363 PBI-Gordon Corporation (19??) Target Physical/Chemical Properties. (Unpublished study received Jan 2, 1980 under 2217-EX-2; CDL:241584-E)

00028174 S.C. Johnson and Sons, Incorporated (19??) Johnson Yard Master Foam Lawn Weed Killer: Analytical Stability Data. Includes undated method. (Unpublished study received Oct 30, 1972 under 4822-124; CDL:007519-A)

00028194 Stagen, R.; Omilinsky, B.; Lyons, R.J.; et al. (1971) Laboratory Report: Report No. 7. (Unpublished study received Oct 7, 1971 under 876-156; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:005075-A)

00028270 Velsicol Chemical Corporation (19??) Name, Chemical Identity and Composition of Technical Dicamba. (Unpublished study received Jun 19, 1969 under 9F0849; CDL:093145-B)

00028271 Velsicol Chemical Corporation (19??) Composition of Technical Dicamba. (Unpublished study received Jun 19, 1969 under 9F0849; CDL:093145-D)

00028278 Velsicol Chemical Corporation (19??) [Chemical Properties of Dicamba]. (Unpublished study received Apr 24, 1968 under unknown admin. no.; CDL:123940-A)

00028284 Velsicol Chemical Corporation (1969) Banvel(R) Herbicide Solution. (Unpublished study received Sep 25, 1979 under 876-25; CDL:241018-C)

00028314 O.M. Scott & Sons Company (1967) The Stability of 2,4-D-Dicamba Combinations on Vermiculite and Fertilizer Carriers. (Unpublished study received Jan 10, 1967 under 538-9; CDL:004053-A)

00028315 Stagen, R. (1971) B12D; B12T; and B14D Oil Soluble Formulations: Report No. 8. (Unpublished study received Jan 25, 1972 under 876-168; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:133116-A)

00028318 Velsicol Chemical Corporation (19??) Name, Chemical Identity, and Composition of Technical Dicamba. (Unpublished study received Jun 30, 1965 under 6F0466; CDL:092755-A)

00028328 Born, G.L. (1979) Long Term Shelf Life Storage. (Unpublished study including letter dated Jan 24, 1979 from G.L. Born to U.S. Environmental Protection Agency, Office of Pesticide Programs, Registration Div., received Jan 24, 1979 under 538-33; submitted by O.M. Scott & Sons Co., Marysville, Ohio; CDL:236858-A)

00028334 Velsicol Chemical Corporation (1979) [Identification of the Product Banvel(R)]. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-A)

00028335 Velsicol Chemical Corporation (19??) Description of Manufacturing Process: [Banvel]. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-B)

00028336 Velsicol Chemical Corporation (19??) Simplified Reaction Scheme for the Synthesis of Technical Banvel(R). (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-C)

00028337 Velsicol Chemical Corporation (19??) [Flow Diagrams Synthesis of Dichlorophenol and Technical Banvel]. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-D)

00028338 Velsicol Chemical Corporation (1973) Raw Materials Specifications and Monitoring. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-E)

00028339 Velsicol Chemical Corporation (1972) Determination of Water in Recovered Methanol by Specific Gravity (Hydrometer Method). Undated method AM 0224. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-F)

00028340 Velsicol Chemical Corporation (1973) Karl Fischer Method for Moisture Content of Benzoic Acid. Undated method AM 5023. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-G)

00028341 Velsicol Chemical Corporation (1971) Determination of APHA Color of Liquid and Solid Resins and Chemicals. Undated method AM 7051B. (Unpublished study including published data, received Feb 8, 1979 under 876-36; CDL:237393-H)

00028342 Velsicol Chemical Corporation (1972) Determination of the Melting Point of 1,2,4-Trichloro benzene. Undated method AM 0223. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-I)

00028343 Velsicol Chemical Corporation (1970) Analysis of Caustic Soda. Undated method AM 5006. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-J)

00028344 Velsicol Chemical Corporation (19??) Muriatic Acid Test Method. Three undated methods. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-K)

00028345 Velsicol Chemical Corporation (19??) Muriatic Acid Test Method. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-L)

00028346 Velsicol Chemical Corporation (19??) High-Purity Muriatic Acid Specifications. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-M)

00028347 Velsicol Chemical Corporation (1977) Hydrolyzer Feed. Four undated methods. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-N)

00028348 Velsicol Chemical Corporation (19??) Composition of Technical Banvel(R) Intermediates. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-O)

00028349 Velsicol Chemical Corporation (1974) D-104-OH DCP Column Overhead. Four undated methods. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-P)

00028350 Velsicol Chemical Corporation (1974) D-201-BTMS and B-203 Storage. Three undated methods. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-Q)

00028351 Velsicol Chemical Corporation (19??) B-206 Carbonation Slurry. Undated method. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-R)

00028352 Velsicol Chemical Corporation (1977) D-220 BTMS. Two undated methods. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-S)

00028353 Velsicol Chemical Corporation (1977) B-212. Two undated methods. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-T)

00028354 Velsicol Chemical Corporation (1971) Determination of Volatile Content. Undated method AM 0417A. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-U)

00028355 Velsicol Chemical Corporation (1973) Dichlorosalicylic acid in Technical Banvel. Undated method AM 0577. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-W)

00028356 Velsicol Chemical Corporation (1974) Capillary Column Control Analysis for Methyl esters in Banvel (GC). Undated method AM 0582A. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-X)

00028358 Velsicol Chemical Corporation (1972) Determination of the Color of Banvel-D. Undated method AM 0233. (Unpublished study received Feb 8, 1979 under 876-36; CDL:237393-AA)

00028360 Velsicol Chemical Corporation (19??) Name, Chemical Identity and Composition of Technical Dicamba. (Unpublished study received May 16, 1968 under 8F0725; CDL:093035-A)

00028361 Velsicol Chemical Corporation (19??) Composition of Technical Dicamba. (Unpublished study received May 16, 1968 under 8F0725; CDL:093035-C)

00028396 Momar, Incorporated (19??) Quality Control Test for Chlorine Content. Undated method. (Unpublished study received on unknown date under 1553-83; CDL:101698-A)

00035914 Woolson, E.A.; Thomas, R.F.; Ensor, P.D.J. (1972) [Without title]. Journal of Agricultural and Food Chemistry 20(2):351-354. (Also [In unpublished submission received Sep 24, 1970 under 1E1046; submitted by U.S. Dept. of the Army, Office of the Chief of Engineers, Washington, D.C.; CDL]096474-D)

00036929 Velsicol Chemical Corporation (19??) Dicamba--Manufacturing Process Summary. (Unpublished study received May 16, 1968 under 8F0725; CDL:093035-B)

00038389 Velsicol Chemical Corporation (1971) Analysis of Technical Banvel D and 2,5-Dichlorophenol for Dioxins at the 0.1 PPM Level. Undated method T-0116. (Unpublished study received Apr 6, 1972 under 2G1259; CDL:095543-D)

00048909 Stull Chemical Company (1969) Stability of Stull Invert Formulations Containing Banvel and Various Other Herbicides at 0° F and 120° F. (Unpublished study received Jul 9, 1969 under 2738-55; CDL:225649-A)

00048910 Stull Chemical Company (1969) Stability of Stull Invert Formulations Containing Banvel and Various Other Herbicides at 0° F and 122° F. (Unpublished study received Jul 8, 1969 under 2738-54; CDL:225648-A)

00048911 Stull Chemical Company (1969) Stability of Stull Invert Formulations Containing Banvel and Various Other Herbicides at 0° F and 122° F. (Unpublished study received Jul 9, 1969 under 2738-55; CDL:225647-A)

00048912 Stull Chemical Company (1969) Stability of Stull Invert Formulations Containing Banvel and Various Other Herbicides at 0° F and 122° F. (Unpublished study received Jul 9, 1969 under 2738-52; CDL:225646-A)

00055663 Burns, J.L.; Anderson, D.L.; Chirchirillo, M.T. (1980) Compatibility Data for Proposed Banvel II Tank Mixes. (Unpublished study received Oct 20, 1980 under 876-255; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:243549-A)

00055668 O.M. Scott & Sons Company (1980) Method of Manufacture: Dry Applied Super Broadleaved Weed Control and Fertilizer F-8791: New Improved Super Turf Builder Plus 2. (Unpublished study received Nov 6, 1980 under 538-167; CDL:243671-A)

00065117 Velsicol Chemical Corporation (19??) Summary of Physical and Chemical Properties of CN10-4359T 50% Wettable Powder. (Unpublished study received Jan 14, 1981 under 876-EX-37; CDL:244095-A)

00066344 Velsicol Chemical Corporation (1978) Name, Chemical Identity and Composition of Dicamba. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-A)

00066345 Velsicol Chemical Corporation (19??) Determination of Melting Point. Undated method no. AM-0470. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-C)

00066346 Velsicol Chemical Corporation (1974) Capillary Column Control Analysis for Methyl Esters in Banvel (GC). Undated method no. AM-0582A. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-D)

00066347 Velsicol Chemical Corporation (1965) Determination of Benzene Insolubles in Banvel-D (Volumetric Centrifugal Method). Undated method no. AM-0230. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-F)

00066348 Velsicol Chemical Corporation (1967) Determination of Alkali Insolubles in Banvel-D (Volumetric Centrifugal Method). Undated method no. AM-0229. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-G)

00066349 Velsicol Chemical Corporation (1971) Determination of APHA Color of Liquid and Solid Resins and Chemicals. Undated method no. AM 7051B. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-J)

00066350 Velsicol Chemical Corporation (1970) Analysis of Caustic Soda. Undated method no. AM-5006. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-L)

00066351 Velsicol Chemical Corporation (19??) Muriatic Acid Test Method. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-M)

00066352 Velsicol Chemical Corporation (1977) Hydrolyzer Feed. Undated method. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-O)

00066353 Velsicol Chemical Corporation (1974) D-104-OH DCP Column Overhead. Undated method. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-P)

00066354 Velsicol Chemical Corporation (1974) D-201-BTMS and B-203 Storage. Undated method. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-Q)

00066355 Velsicol Chemical Corporation (19??) B-206 Carbonation Slurry. Undated method. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-R)

00066356 Velsicol Chemical Corporation (1977) D-220 BTMS. Undated method. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-S)

00066357 Velsicol Chemical Corporation (1977) B-212. Method dated Feb 4, 1977. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-T)

00066358 Velsicol Chemical Corporation (1973) Dichlorosalicylic Acid in Technical Banvel. Undated method no. AM 0577. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-W)

00066359 Velsicol Chemical Corporation (1967) Determination of Alkali Insolubles in Banvel-D (Volumetric Centrifugal Method). Undated method no. AM-0229. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-Y)

00066360 Warakomski, A.; Paluch, C.J.; Srnak, Z.; et al. (1977) Analysis of Technical Banvel: Report 480064, No. 1. (Unpublished study received Apr 20, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070029-AB)

00066361 Velsicol Chemical Corporation (1977) Methand Ethoxylation Procedure: Report 480064, No. 1. Undated method no. AM 0549 A. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-AC)

00066362 Velsicol Chemical Corporation (1977) Determination of AD-21 Resin Insolubles in Mineral Spirits: Report 480064, No. 1. Method no. C-18 dated Mar 6, 1974. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070029-AD)

00066364 Tiernan, T.O.; Taylor, M.L.; Erk, S.D.; et al. (1977) Analysis of Banvel(R) for 2,7-Dichlorodibenzo-p-dioxin and 2,3,7,8-Tetrachlorobenzo-p-dioxin. Undated methods. (Compilation; undated study received Apr 20, 1981 under 876-25; prepared by Wright State Univ., Brehm Laboratory, submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070029-AJ)

00066365 Velsicol Chemical Corporation (1975?) Name, Chemical Identity and Composition of Dicamba. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070028-A)

00066366 Postmus, J.; Trujillo, W.; Forrette, J.E. (1975) Vapor Pressure of Dicamba Using the Thermal Evolution Analyzer: Report 480069, No. 3. (Unpublished study received Apr 20, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070028-B)

00066367 Forrette, J.E.; Postmus, J.; Whitacre, D.M. (1975) Vapor Pressure Measurement Using the Thermal Evolution Analyzer: Report 490055, No. 6. Undated method. (Unpublished study received Apr 20, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070028-C)

00066368 Dias, F.X.; Srnak, Z.; Forrette, J.E. (1980) Determination of the Acid Dissociation Constants, pKa and Ka, of Dicamba: Report 490055, No. 12. (Unpublished study received Apr 20, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070028-D)

00066369 Dias, F.X.; Srnak, Z.; Forrette, J.E. (1980) Determination of the Acid Dissociation Constants (Ka and pKa): Report 490055, No. 13. Two undated methods. (Unpublished study received Apr 20, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070028-E)

00066370 Yu, C.C.; Thomas, P.L.; Atallah, Y.H.; et al. (1979) Partition Coefficient of Dicamba, Endrin, VEL 3510 and Several Industrial Chemicals and Flame Retardants: Report 480068/480048/414648/ 482308/482108/484088/426918/482448, No. 4/1/4/3/1/1/2. (Unpublished study received Apr 20, 1981 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:070028-F)

00066371 Velsicol Chemical Corporation (1975) Banvel(R) Technical. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070028-G)

00066372 Velsicol Chemical Corporation (1969) Determination of Melting Point. Undated method no. AM-0470. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070028-I)

00066373 Velsicol Chemical Corporation (1980) Assay for Dicamba in Banvel 4S (IR). Method no. AM-0712 dated Apr 1, 1980. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070028-J)

00073277 Velsicol Chemical Corporation (1969) Banvel(R) Herbicide Solution. (Unpublished study received Apr 20, 1981 under 876-25; CDL:070032-C)

00075713 Marchio, J.L.; Spurlock, O.L. (1981) Letter sent to L.J. Helfant dated May 7, 1981: Nitrosamines in Super D Weedone, FWC. (Unpublished study received Jun 8, 1981 under 264-190; submitted by Union Carbide Agricultural Products Co., Inc., Ambler, Pa.; CDL:245480-A)

00078452 Marchio, J.L.; Spurlock, O.L. (1981) Letter sent to Stan Harrison dated Jan 20, 1981 [Analyses for nitrosamine]. (Unpublished study, including letter dated Sep 18, 1980 from J. Kruzynski to S.L. Harrison, received Jun 24, 1981 under 264-47; submitted by Union Carbide Agricultural Products Co., Inc., Ambler, Pa.; CDL:245309-A)

00078878 Ralston Purina Company (1981) Four Power Plus: RT Lab No. 866441. Includes undated method entitled: Analysis of non-polar nitrosamines. (Unpublished study received Jul 16, 1981 under 34704-84; submitted by Platte Chemical Co., Fremont, Nebr.; CDL:245565-A)

00082612 Allen, A. (1981) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-2586. (Unpublished study received May 15, 1981 under 2217-648; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, Kans.; CDL:245094-A)

00083119 PBI/Gordon Corporation (1981) Confidential Statement of Formula: Gordon's Brush Killer 823. (Unpublished study received Jul 15, 1981 under 2217-624; CDL:245537-F)

00083124 PBI/Gordon Corporation (1981) Confidential Statement of Formula: BL 8,000 Lawn Weed Killer. (Unpublished study received Jul 15, 1981 under 2217-624; CDL:245537-S)

00083125 PBI/Gordon Corporation (1981) Confidential Statement of Formula: Trimec(R) 448 Turf Herbicide Mfg. Conc. (Unpublished study received Jul 15, 1981 under 2217-624; CDL:245537-T)

00083127 PBI/Gordon Corporation (1981) Confidential Statement of Formula: Gordon's Professional Turf Products' Trimec(R) Herbicide. (Unpublished study received Jul 15, 1981 under 2217-624; CDL:245537-V)

00084413 O.M. Scott & Sons Company (19??) Method of Manufacture: [Super Plus 2 Weed Control]. (Unpublished study received Nov 23, 1981 under 538-175; CDL:246282-A)

00084414 O.M. Scott & Sons Company (19??) Methods of Manufacture: [Dry Applied Fertilizer Plus Dicot Weed Control]. (Unpublished study received Nov 23, 1981 under 538-175; CDL:246282-B)

00084415 O.M. Scott & Sons Company (19??) Accelerated Shelf Life Study: [Super Plus 2 Weed Control]. (Unpublished study received Nov 23, 1981 under 538-175; CDL:246282-C)

00084416 O.M. Scott & Sons Company (19??) Accelerated Shelf Life Study: [Dry Applied Fertilizer plus Dicot Weed Control]. (Unpublished study received Nov 23, 1981 under 538-175; CDL:246282-D)

00087666 Helton, D.O. (1979) Letter sent to John Wise dated Feb 8, 1979: MRI letter report: Dimethylnitrosamine analysis in herbicide formulations: MRI Project No. 4534-C. (Unpublished study received Mar 6, 1979 under 1990-332; prepared by Midwest Research Institute, submitted by Farmland Industries, Inc., Kansas City, Mo.; CDL:237782-A)

00087667 Helton, D.O. (1978) Letter sent to John Wise dated Oct 26, 1978: Letter report: Dimethylnitrosamine analysis in herbicide formulations: MRI Project No. 4534-C. Unpublished study; 8 p.

00088574 PBI/Gordon Corporation (1981) Confidential Statement of Formula: Gordon's Brush Killer 801. (Unpublished study received Jul 15, 1981 under 2217-624; CDL:245537-M)

00088575 PBI/Gordon Corporation (1981) Confidential Statement of Formula: Gordon's Brush Killer 800. (Unpublished study received Jul 15, 1981 under 2217-624; CDL:245537-Q)

00089021 Cantor, L. (1981) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-3144. (Unpublished study received Jan 4, 1982 under 2217-647; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, Kans.; CDL:246522-A)

00092479 Gold, H.S. (1968) Letter sent to Pesticides Reference Standards Section dated Apr 25, 1968 [Concerning samples of dicamba]. (Unpublished study received May 16, 1968 under 8F0725; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:093035-D)

00092480 Stolberg, M.A. (1963) Letter sent to Percy B. Polen dated Feb 5, 1963 [Concerning Banvel-D]. (Unpublished study received Dec 11, 1963 under 4876-25; prepared by New England Nuclear Corp., submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:120181-C)

00092491 Loy, T.R. (1977) Letter sent to Martin D. Rogoff dated Jan 21, 1977: Dimethylnitrosamine content of Banvel(R) products. (Unpublished study received Mar 2, 1977 under 876-25; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:228159-A)

00093696 Cantor, L. (1981) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-3267. (Unpublished study received Jan 8, 1982 under 2217-655; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, Kans.; CDL:246578-A)

00094823 Thermo Electron Corporation (1981) [Analysis of Gordon's 2,4-D1 Dicamba Amine Turf Herbicide]. (Unpublished study, including letter dated Dec 11, 1981 from U.A. Wessling to Richard Mountfort, received Dec 29, 1981 under 2217-647; submitted by PBIGordon Corp., Kansas City, Kans.; CDL:246521-A)

00094851 Velsicol Chemical Corporation (19??) [Analytical Study of CN-10-4359]. (Compilation; unpublished study received Feb 11, 1982 under 876-443; CDL:246811-A)

00096319 Cantor, L. (1982) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-3360. (Unpublished study received Feb 19, 1982 under 2217-657; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, Kans.; CDL:246839-A)

00096627 Cantor, L. (1982) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-3379. (Unpublished study received Mar 15, 1982 under 2217-656; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, Kans.; CDL:247003-A)

00100096 Rozek, A.; Grins, G.; Smith, M.; et al. (1978) Analysis of Various Pesticide Formulations for Nitrosamine Content: Report 480060, No. 2. (Unpublished study received Aug 29, 1978 under 876-234; submitted by Velsicol Chemical Corp., Chicago, IL; CDL:235035-B)

00100976 Forrette, J.; Trujillo, W.; Smith, M.; et al. (1977) Analysis of the Dimethylnitrosamine Content of Technical Dicamba, Principal Banvel Formulations and Dimethylamine Used in the Formulation of Banvel Products: Report 480060, No. 4. (Unpublished study received Aug 29, 1978 under 876-234; submitted by Velsicol Chemical Corp., Chicago, IL; CDL:235035-A)

00100977 Rozek, A. (1978) Dimethylnitrosamine Storage Stability Study for Banvel DMA Formulations. (Unpublished study received Aug 29, 1978 under 876-234; submitted by Velsicol Chemical Corp., Chicago, IL; CDL:235035-C)

00101525 Eckerl, J.A. (1982) Determination of N-Nitrosodimethylamine in a Sample for Testing Broadleaf Spot Weed Killer Aerosol: PGU-01-82. Unpublished study; 10 p.

00101613 Eckert, J. (1982) Determination of N-Nitrosodimethylamine in a Sample for Testing Broadleaf Spot Weed Killer Aerosol: PGU-01-82: 1.21% DMA Salt of 2,4-D; 31% DMA Salt of Dicamba. Unpublished study; 10 p.

00104673 Cantor, L. (1982) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-3341. (Unpublished study received Feb 2, 1982 under 2217-662; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, Kans.; CDL:246710-A)

00105194 Gaudin, D. (1982) Summary of Results: [Assay for N-nitrosodimethylamine in 2,4-D]. (Unpublished study received Jun 15, 1982 under 677-446; submitted by Diamond Shamrock Agricultural Chemicals, Cleveland, OH; CDL:247714-A)

00106021 Cantor, L. (1981) Formal Report of Analysis for N-nitroso Compounds: Report No. 5450-2980. (Unpublished study received Jul 7, 1982 under 2217-681; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, MO; CDL:247822-A)

00108554 Tiernan, T.; Taylor, M.; Erk, S.; et al. (1977) Analysis of Banvel for 2,7-Dichlorodibenzo-p-dioxin and 2,3,7,8-Tetrachlorodibenzo-p-dioxin. (Unpublished study received Mar 10, 1978 under 876-36; prepared by Wright State Univ., Brehm Laboratory, submitted by Velsicol Chemical Corp., Chicago, IL; CDL:233349-C)

00112870 Cormier, J. (1982) Formal Report of Analysis for N-nitroso Compounds: Report No. 5450-3832. (Unpublished study received Aug 30, 1982 under 2217-603; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, MO; CDL:248222-A)

00118420 Cantor, L. (1982) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-3979. (Unpublished study received Nov 23, 1982 under 2217-671; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, MO; CDL:248890-A)

00123280 Dow Chemical U.S.A. (1978) [Chemical Study: Picloram]. (Compilation; unpublished study received Dec 9, 1982 under 464-502; CDL:248983-A)

00126081 Cantor, L. (1982) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-4246. (Unpublished study received Feb 7, 1983 under 2217-543; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, MO; CDL:249479-A)

00126136 Cantor, L. (1982) Formal Report of Analysis for N-nitroso Compounds: Report No. 5450-4221. (Unpublished study received Dec 17, 1982 under 802-547; prepared by Thermo Electron Corp., submitted by Chas. H. Lilly Co., Portland, OR; CDL:249140-A)

00126683 Cantor, L. (1982) Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-3979. (Unpublished study received Apr 1, 1983 under 2217-703; prepared by Thermo Electron Corp., submitted by PBI-Gordon Corp., Kansas City, MO; CDL:249863-F)

00127784 PBI-Gordon Corp. (1983) Product Chemistry: [Mecoprop, Trimec]. (Compilation; unpublished study received Apr 1, 1983 under 2217-EX-3; CDL:071501-A)

00129634 O.M. Scott & Sons Co. (1983) Product Chemistry to Support Proturf Fertilizer Plus Dicot Weed Control III. (Compilation; unpublished study received Jul 28, 1983 under 538-186; CDL:250866-A)

00133564 Velsicol Chemical Corp. (1983) Product Chemistry Data: Application for New Product Registration: Banvel Herbicide (the Potassium Formulation). (Compilation; unpublished study received Dec 14, 1983 under 876-449; CDL:252024-A)

00139944 Suzuki, H.K.; Schwemmer, B.A.; Whitacre, D.M.; et al. (1974) Methylation of Dicamba and 3,6-Dichlorosalicylic Acid: Report No. 404000, No. 133. (Unpublished study received Jan 29, 1974 under 1F1131; submitted by Velsicol Chemical Corp., Chicago, Ill.; CDL:091953-B)

00139947 Velsicol Chemical Corporation (1971) Chlorodibenzo-dioxins in Technical Dicamba. (Unpublished study received on unknown date under 1F1131; CDL:091953-J)

00139952 Velsicol Chemical Corporation (19??) Name, Chemical Identity, and composition of Technical Dicamba. (Unpublished study received Jan 11, 1971 under 1F1131; CDL:091953-Q)

00139953 Velsicol Chemical Corporation (19??) Manufacturing Process: [Dicamba]. (Unpublished study received Jan 11, 1971 under 1F1131; CDL:091953-R)

00139954 Velsicol Chemical Corporation (1969) [Study of the Chemical Banvel]. (Compilation; unpublished study received Jan 11, 1971 under 1F1131; CDL:091953-S)

00139958 Velsicol Chemical Corporation (1967) Specific Gravity (Hydrometer Method). Method AM 0430 dated Jul 26, 1967. (Unpublished study received Jan 11, 1971 under 1F1131; CDL:091953-X)

00141100 Eimanis, A. (1984) Letter sent to R. Taylor dated May 23, 1984: Dicamba registration standard reviewer comments on MRID No. 00065846 received by Velsicol as part of a FOI request, Prepared by Velsicol Chemical Corp. 5 p.

00143503 Velsicol Chemical Corp. (1984) Banvel Technical Dicamba Herbicide: Product Chemistry Data Submitted in Partial Fulfillment of Requirements of Dicamba. Unpublished compilation. 18 p.

00143504 Velsicol Chemical Corp. (1984) Banvel Herbicide: Product Chemistry Data Submitted in Partial Fulfillment of Requirements for the Re-registration of Dicamba. Unpublished compilation. 15 p.

00145022 Craine, E. (1984) A Stability Study with Lesco Tri-Power: Project WIL-23011. Unpublished study prepared by Wil Research Laboratories, Inc. 16 p.

00146715 Union Carbide Agricultural Products Company, Inc. (19??) Product Chemistry [Super D Weedone Brand--Manufacturing Concentrate]. Unpublished compilation. 27 p.

00146718 Union Carbide Agricultural Products Company, Inc. (19??) Product Chemistry [Weedone Brand Super D--Pro Amine Herbicide]. Unpublished compilation. 28 p.

00146719 Union Carbide Agricultural Products Company, Inc. (19??) Product Chemistry [Super D Weedone Brand--Weed Killer Ready-To-Use]. Unpublished compilation. 28 p.

00147899 Velsicol Chemical Corp. (1985) Summary of Physical and Chemical Properties of the Dicamba/Atrazine Premix. Unpublished study. 1 p.

00150273 Velsicol Chemical Corp. (1985) [Product Chemistry Data of Weedmaster Herbicide]. Unpublished compilation. 27 p.

00153077 Merchant, S. (1985) Letter sent to O. Messerschmidt dated Jul 31, 1985: 2,4D production impurities. Prepared by Velsicol Chemical Corp. 3 p.

00158472 Askew, D.; Craine, E. (1986) A Method for Analysis of Active Ingredients in Lesco Three-Way Bentgrass Selective Herbicide: Project: WIL-23016. Unpublished study prepared by Wil Research Laboratories, Inc. in cooperation with Lesco Laboratories. 11 p.

00159448 Wegner, M. (1986) Stauffer Lawn Care Broadleaf Weed Killer Product Chemistry: Report No. RRC 86-45. Unpublished study prepared by Stauffer Chemical Co. 14 p.

00159557 VS Crop Protection Corp. (1986) Banvel Herbicide: Response to EPA's Comment Letter of November 21, 1985: [Storage Stability of Dicamba and Poultry Feed Studies]. Unpublished compilation. 87 p.

00159931 Craine, E. (1986) A Stability Study with LESCO Tri-Power: Project: WIL-23011: Analytical Report No. 86:3. Unpublished study prepared by WIL Research Laboratories, Inc. 29 p.

00160096 Craine, E. (1986) Product Chemistry, Lesco Three-Way Bentgrass Selective Herbicide:Project No. WIL-23016. Unpublished study prepared by WIL Research Laboratories, Inc. 2 p.

00161968 Brillante, S. (1986) Active Ingredient Analysis of Sample Aged for 23 Months: Lilly/Miller Feed & Weed. Unpublished compilation prepared by Coffey Laboratories, Inc. 7 p.

00162066 Sandoz Crop Protection Corp. (1986) CN-11-4962: Product Chemistry Packet. Unpublished compilation. 11 p.

00163525 PBI/Gordon Corp. (1986) EH-870 Product Chemistry. Unpublished study. 2 p.

00163532 PBI/Gordon Corp. (1986) EH 869 Product Chemistry. Unpublished study. 2 p.

00165349 Cantor, L. (1983) Formal Report of Analysis for N-nitroso Compounds: Clean Crop Di-Mec Amine: Report No. 5450-4807. Unpublished study prepared by Thermo Electron Corp. 8 p.

00165350 Cantor, L. (1983) Formal Report of Analysis for N-nitroso Compounds: Clean Crop Mec Amine: 5450-4807. Unpublished study prepared by Thermo Electron Corp. 10 p.

40041501 Goff, U. (1986) Trimec 869 (EH 869): Formal Report of Analysis for N-Nitroso Compounds: Report No. 5450-2407. Unpublished study prepared by Thermedics, Inc. Analytical Services Laboratory. 24 p.

40053701 Cahoy, R. (1987) Trimec 871 - Product Chemistry. Unpublished study prepared by PBI/Gordon Corp. 6 p.

40057301 Cahoy, R. (1987) Trimec M 10,000 - Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp. Formulation Laboratory. 7 p.

40124701 Cahoy, R. (1987) Trimec 902 - Product Chemistry. Unpublished study prepared by PBI/Gordon Corp. Formulation Laboratory. 7 p.

40167701 Nationwide Chemical Products, Inc. (1987) Liquid Weed & Feed for Sensitive Grasses: Product Chemistry Data. Unpublished compilation. 14 p.

40167801 Nationwide Chemical Products, Inc. (1987) Liquid Weed & Feed: Product Chemistry Data. Unpublished compilation. 14 p.

40171801 Cahoy, R. (1987) Trimec M 887 Liquid Weed & Feed 20-0-0--Product Chemistry [Data]. Unpublished study prepared by PBI/Gordon Corp. 7 p.

40171802 Goff, U. (1987) Trimec M 887 Liquid Weed & Feed 20-0-0: Formal Report of Analysis for N-Nitroso Compounds: Laboratory Project ID: 5450-2461. Unpublished study prepared by Thermedics Inc. 20 p.

40171901 Cahoy, R. (1987) Trimec M 886 Liquid Weed & Feed 20-0-0--Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp. 4 p.

40171902 Goff, U. (1987) Trimec M 886 Liquid Weed & Feed 20-0-0: Formal Report of Analysis for N-nitroso Compounds: Laboratory Project ID: 5450-2461. Unpublished study prepared by Thermedics Inc. 20 p.

40182901 Cahoy, R. (1987) Trimec M 903--Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp. 7 p.

40183001 Cahoy, R. (1987) Trimec M 904--Product Chemistry. Unpublished Compilation prepared by PBI/Gordon Corp. 7 p.

40183101 Cahoy, R. (1987) Trimec M 905--Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp. 7 p.

40200101 Tucker, D. (1987??) Product Chemistry in Support of Registration of Paraquat 2 SC: Laboratory Project ID: MICRO-FLO PRQT-EU-2. Unpublished compilation prepared by Chempax. 84 p.

40200201 Cahoy, R. (1987) Trimec M 10,000--Product Chemistry. Unpublished study prepared by PBI/Gordon Corp. 3 p.

40237901 Valentine, D. (1987) Liquid Weed & Feed for Sensitive Grasses 20-0-0: Product Chemistry Data. Unpublished study prepared by Nationwide Chemical Products, Inc. 14 p.

40286701 Valentine, D. (1987) Liquid Weed & Feed 25-0-0: [Product Chemistry]. Unpublished study prepared by Nationwide Chemical Products, Inc. 14 p.

40307001 Cahoy, R. (1987) Trimec M 908 Liquid Weed & Feed--Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp. 7 p.

40307002 Steven, J. (1987) Trimec M 908 Liquid Weed & Feed: Formal Report of Analysis for N-Nitroso Compounds: Laboratory Project ID: 5450-2815. Unpublished study prepared by Thermedics Inc. 18 p.

40314401 Cahoy, R. (1987) Trimex M 892 Weed & Feed--Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp. 7 p.

40314402 Goff, U. (1987) Trimec M 892 Weed & Feed: Formal Report of Analysis for N-Nitroso Compounds: Lab Project ID: 5450-2580. Unpublished study prepared by Thermedics Inc. 18 p.

40314501 Cahoy, R. (1987) Trimec M 891 Weed & Feed--Product Chemistry. Unpublished study prepared by PBI/Gordon Corp. 7 p.

40314502 Goff, U. (1987) Trimec M 891 Weed & Feed: Formal Report of Analysis for N-Nitroso Compounds: Laboratory Project ID: 5450-2580. Unpublished study prepared by Thermedics Inc. 18 p.

40339801 Cahoy, R. (1987) Trimec 914--Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp., Formulation Laboratory. 7 p.

40339802 Stevens, J. (1987) Trimec 914: Formal Report of Analysis for N-Nitroso Compounds: Laboratory Project ID: 5450-3165. Unpublished compilation prepared by Thermedics Inc., Analytical Service Laboratory. 14 p.

40475901 Allen, L.; Mahlburg, W. (1987) Clean Crop Mec-Amine D: Product Chemistry Data: Study No. 87-17A. Unpublished study prepared by Transbas, Inc. Laboratory. 10 p.

40476001 Allen, W.; Mahlburg, W. (1987) Product Chemistry Data: Clean Crop Mec-Amine Plus: Study No. 87-19A. Unpublished compilation prepared by Transbas, Inc. Laboratory. 12 p.

40476101 Allen, L.; Mahlburg, W. (1987) Clean Crop Four Plus Herbicide: Product Chemistry Data: Study No. 87-18A. Unpublished study prepared by Transbas, Inc. Laboratory. 10 p.

40546601 Klettke, M. (1988) Lilly/Miiler Ready-to-use Spurge & Oxalis Killer Product Chemistry Data. Unpublished study prepared by The Chas H. Lilly Co. 35 p.

40589101 Cahoy, R. (1988) Trimec 922--Product Chemistry. Unpublished compilation prepared by PBI/GORDON Corp Formulation Laboratory. 7 p.

40596501 Cahoy, R. (1988) Trimec M936--Product Chemistry. Unpublished compilation prepared by PBI/Gordon Corp. 4 p.

40651501 Cahoy, R. (1988) Trimec 973 Weed & Feed - Product Chemistry. Unpublished study prepared by PBI/Gordon Corp. 7 p.

40651701 Cahoy, R. (1988) Trimec 970--Product Chemistry. Unpublished study prepared by PBI/Gordon Corp. 7 p.

40748301 Klettke, M. (1988) Lilly/Miller Ready-to-Use Spurge & Oxalis Killer: Product Chemistry Data. Unpublished study prepared by Columbia Laboratories, Inc. 21 p.

40791201 Cahoy, R. (1988) Trimec 937--Product Chemistry [Data]. Unpublished study prepared by PBI/Gordon Corp., Formulation Laboratory. 7 p .

40874901 Belkind, B. (19??) Theoretical Discussion of Development of HDD/HDF Impurities in Dicamba Manufacture: Project ID: CHE-26. Unpublished study prepared by Sandoz Crop Protection Corp. 17 p.

40874902 Forrette, J. (1982?) Analysis for 2,3,7,8-TCDD or its Precursors in Samples from the Dicamba Process: Laboratory Report: Project No. 480061; Report No. 6. Unpublished study prepared by Velsicol Chemical Corp. 80 p.

40874903 Hsieh, T. (1985?) Analysis of Dichlorodibenzenzo-p-dioxin in Technical Dicamba, Banvel Herbicide and Dichlorophenol Samples: Laboratory Report: Project No. 480063; Report No. 4. Unpublished study prepared by Velsicol Chemical Co. 56 p.

TABLE A. GENERIC DATA REQUIREMENTS FOR DICAMBA.

Data Requirement	Test Substance[1]	Does EPA have data to satisfy this requirement?	Bibliographic Citation[2]	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?	Time Frame For Data Submission[3]
40 CFR §158.240 Residue Chemistry					
171-2. Chemical Identity[4]					
171-3. Directions for Use[5]		(See Index)			
171-4. Nature of the Residue (Metabolism) - Plants	PAIRA & plant metabolites	Yes	00022745. 00022753. 00025344. 00036921. 00079708. 00079747. 00102945. 00118473.	No	
171-4. Nature of the Residue (Metabolism) - Livestock	PAIRA & plant metabolites	Partially	00077779. 00145248.	Yes[6]	15 months
171-4. Residue Analytical Methods	TGAI & metabolites	Partially	00028263. 00079736. 00079744. 00088173. 00162206*. 40233501*.	Yes[7,8,9]	15 months
171-4. Storage Stability	TEP & metabolites	Partially	40663801*.	Yes[10]	15 months
171-4. Magnitude of Residue in Plants					
Legume Vegetables - Soybeans	TEP	Yes	00102944.	No	
Foliage of Legume Vegetables - Soybean forage and hay	TEP	Yes	00102944.	No	

(Continued, footnotes follow)

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TABLE A. GENERIC DATA REQUIREMENTS FOR DICAMBA (Continued).

Data Requirement	Test Substance	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?	Time Frame For Data Submission
Cereal Grains					
- Barley	TEP	Partially	00028252. 00162206*.	Yes[11]	24 months
- Corn grain	TEP	Partially	00015636. 00015637. 00015640. 00015641. 00015642. 00015786. 00016435. 00016436. 00016437. 00016438. 00022612. 00022613. 00022618. 00023584. 00023684. 00025364. 00025383. 00028269. 00075715. 00088172.	Yes[12]	24 months
- Millet	TEP	Partially	00025330.	Yes[11]	24 months
- Oats	TEP	Partially	00023687. 00028525.	No[13] Yes[11]	18 months 24 months
- Sorghum	TEP	Partially	00022622. 00078448.	Yes[14,15] Yes[16]	18 months 24 months
- Wheat	TEP	Partially	00004541. 00004566. 00023687. 00025394. 00028398. 00162206*. 40663801*.	Yes[17]	24 months

(Continued, footnotes follow)

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TABLE A. GENERIC DATA REQUIREMENTS FOR DICAMBA (Continued).

Data Requirement	Test Substance	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?	Time Frame For Data Submission
Forage, Fodder, and Straw of Cereal Grains					
- Barley forage, hay, and straw	TEP	Partially	00028252. 00162206*.	Yes[18]	18 months
- Corn forage and fodder	TEP	Yes	00015636. 00015637. 00015640. 00015641. 00015642. 00015786. 00016435. 00016436. 00016437. 00016438. 00022612. 00022613. 00022618. 00023584. 00023684. 00025364. 00025383. 00028269. 00075715. 00088172.	No	
- Millet forage, hay, and straw	TEP	Partially	00025330.	Yes[18]	18 months
- Oat forage, hay, and straw	TEP	Partially	00023687. 00028252.	Yes[18]	18 months
- Rye forage and hay	TEP	Partially	N/A.	Yes[18]	18 months
- Sorghum forage and fodder	TEP	Partially	00022622. 00078448.	Yes[19,20,21]	18 months

(Continued, footnotes follow)

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TABLE A. GENERIC DATA REQUIREMENTS FOR DICAMBA (Continued).

Data Requirement	Test Substance	Does EPA have data to satisfy this requirement?	Bibliographic Citation	Must additional data be submitted under FIFRA Sec. 3(c)(2)(B)?	Time Frame For Data Submission
- Wheat forage, hay, and straw	TEP	Partially	00004541. 00004566. 00023687. 00025394. 00055662. 00162206*.	Yes[22]	
Grass Forage, Fodder, and Hay					
- Pasture and rangeland grasses	TEP	Partially	00028173. 00028200. 00028267. 00028268.	Yes[23]	18 months
Miscellaneous Commodities					
- Asparagus	TEP	Partially	00025338.	Yes[24]	18 months
- Sugarcane	TEP	Partially	00030701. 00079738. 00149626.	Yes[25]	24 months
171-4. Magnitude of Residue in Animals					
Milk, Meat, Poultry, and Eggs	TGAI or plant metabolites	Partially	0079742. 00116671. 00148127*.	Reserved[26]	18 months

1. Test substance: MP = manufacturing-use product; PAI = purified active ingredient; TEP = typical end-use product; TGAI = technical grade of the active ingredient.

2. MRID numbers designated by an asterisk (*) contain data submitted in response to the Guidance Document or otherwise not reviewed in the initial Science Chapter.

3. Data must be submitted within the indicated time interval after the date of this Second Round Review.

4. The same chemical identity data are required as under 40 CFR §158.150-190, with emphasis on impurities that could constitute residue problems. Refer to Product Chemistry Data Requirements tables.

5. The registrant must amend appropriate product labels to specify a maximum application rate to wheat grown for pasture only. In addition, the registrant must amend all pertinent product labels to reflect an appropriate preslaughter interval of 1-3 days for meat animals.

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TABLE A. GENERIC DATA REQUIREMENTS FOR DICAMBA (Continued).

6. Metabolism studies utilizing ruminants and poultry. Animals must be dosed orally for a minimum of 3 days with ring-labeled [^{14}C]dicamba at a level sufficient to make residue identification and quantification possible. Milk and eggs must be collected twice a day during the dosing period. Animals must be sacrificed within 24 hours of the final dose. The distribution and identity of residues must be determined in milk, eggs, liver, kidney (expect poultry), muscle, and fat. Representative samples from the required metabolism studies must also be analyzed using a suitable confirmatory method such as MS or HPLC. Samples from these studies must also be analyzed using suitable enforcement methods to ascertain that the methods are capable of adequately recovering and identifying all residues of toxicological concern. Data depicting the nature of dicamba residues in swine may also be required if studies with ruminants and poultry reveal that the metabolism of dicamba in these animals differs from that in rats.

7. Representative samples of plant and animal commodities bearing dicamba residues of concern must be subjected to multiresidue protocols I and III published in PAM Vol. I, Appendix II, available from the National Technical Information Service under Order No. PB 203734/AS.

8. Successful confirmatory trials of the method designated AM-0691A and AM-0691B must be conducted by an independent laboratory. Results of at least one set of samples each for an oil seed crop and a forage crop must be submitted. No more than three sets of samples per commodity may be tested to achieve successful recovery rates of 70-120 % with negligible interference compared to the established tolerances. For additional details of data requirements, refer to PR Notice 88-5, Tolerance Enforcement Methods - Independent Laboratory Confirmation by Petitioner.

9. The nature of the residue in animals is not adequately understood. If the metabolism studies requested in "Qualitative Nature of the Residue in Animals" reveal the presence of additional metabolites of concern, additional validated methods for data collection and tolerance enforcement may be required.

10. The sample storage conditions and intervals must be supplied for all required and previously submitted residue data for plant and animal commodities. Storage stability data in support of previously submitted residue data are required for only those samples deemed to be useful for tolerance assessment. Data are also required which depict the decline in levels of dicamba residues of concern in commodities stored under the range of conditions and for the range in intervals specified. Crop samples bearing measurable weathered residues or fortified with dicamba residues of concern and fortified meat, milk, and egg samples must be analyzed immediately after harvest or fortification and again after storage intervals that represent actual residue sample storage conditions and allow for reasonable unforseen delays in sample analysis. In laboratory tests using fortified samples, the pure active ingredient and pure metabolites must be used. However, if field weathered samples are used, the test substance must be a typical end-use product. For additional guidance on conducting storage stability studies, the Registrant is referred to an August 1987 Position Document on the Effects of Storage on Validity of Pesticide Residue Data available from NTIS under order no. PB 88112362/AS.

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TABLE A. GENERIC DATA REQUIREMENTS FOR DICAMBA (Continued).

11. The data requested for wheat grain dust will be translated to barley, oats, and millet.

12. Data depicting the combined residues dicamba and its 5-hydroxy metabolite in starch, crude oil, and refined corn from wet milling; grits, meal, flour, and crude and refined oils from dry milling; and in grain dust derived from corn grain bearing measurable, weathered residues. If residues concentrate in any of these commodities, an appropriate food/feed additive tolerance must be proposed.

13. The data available for wheat grain will translate to oat grain.

14. Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum grain following a single postemergence broadcast application of a representative SC/L formulation at 0.25 lb ae/A using aerial equipment according to label directions. Application must be made at or about the time when plants are 15 inches tall and harvested 30 days thereafter. Tests must be conducted in KS(37%) and TX(23%) since these states accounted for ca. 70% of the 1987 U.S. sorghum grain production, if KS is representative of NE(15%) (Crop Database, Jan. 1988, Ag. Statistics Board, USDA, NASS).

15. Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum grain following a single preharvest broadcast application of a representative SC/L formulation at 0.25 lb ae/A using ground and aerial equipment in separate tests according to label directions. Applications must be made after the plant has reached the soft dough stage. Tests must be conducted in the states of OK or TX; IL, IN, or MI; and KS, MO, or NE, in order to adequately represent the regions in which this use is permitted.

16. A processing study depicting the combined residues of dicamba and its 5-hydroxy metabolite in milled products (flour and starch) and grain dust from sorghum grain bearing measurable, weathered residues. If residues concentrate in any product, an appropriate food/feed additive tolerance must be proposed.

17. A processing study depicting the combined residues of dicamba and its 5-hydroxy metabolite in grain dust derived from wheat grain bearing measurable, weathered residues. If residues concentrate, an appropriate feed additive tolerance must be proposed.

18. The data requested for wheat forage and hay will by translation satisfy the requirements for data on forage and hay of barley, oats, millet, and rye.

19. Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum forage and fodder, following a single postemergence broadcast application of a representative formulation at a maximum rate of 0.25 lb ae/A using ground or aerial equipment in separate tests according to label directions. Application must be at or about the time when plants are 15 inches tall and harvested 30 days later. Tests must be conducted in the states of KS(51%) and TX(18%) since these states accounted for ca. 70% of the 1987 U.S. sorghum forage production (1982 Census of Agriculture, Vol. 1, Part 51, p. 313).

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TABLE A. GENERIC DATA REQUIREMENTS FOR DICAMBA (Continued).

20. Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on sorghum forage and fodder, following a single preharvest broadcast application of a representative formulation at the maximum rate of 0.25 lb ae/A using ground and aerial equipment in separate tests according to label directions. Applications must be made after the plant has reached the soft dough stage. Tests must be conducted in OK or TX; IL, IN, or MI; and KS, MO, or NE, in order to adequately represent the regions in which this use is permitted.

21. A tolerance must be proposed and supporting residue data submitted for sorghum hay. Alternatively, a feeding restriction may be imposed and the label amended.

22. Data depicting the combined residues of dicamba and its 5-hydroxy metabolite in or on wheat forage and hay harvested following postemergence broadcast application of a representative formulation at 0.5 and 0.75 lb ae/A. Forage must be harvested 7 days following application at 0.5 lb ae/A and 21 days following application at 0.75 lb ae/A and hay must be harvested 37 and 51 days posttreatment, respectively. Alternatively, the data must reflect the rate(s), PHI(s), and pregrazing intervals proposed by the registrant for this use on amended product labels. Based on these required residue data, tolerances must be proposed for the combined residues of dicamba and its 5-hydroxy metabolite in or on wheat forage and hay. The tests must be conducted in the states of CO(5%), KS(17%), MT(7%), ND(13%), OK(6%), TX(5%), and WA(5%), since these states accounted for ca 60% of the 1987 U.S. wheat forage and hay production (USDA Crop Database, Ag. Statistics Board, NASS, Jan. 1988). The registrant must amend appropriate product labels to specify a maximum application rate to wheat grown for pasture only.

23. The registrant must propose revisions in the established tolerances for combined residues of dicamba and its 5-hydroxy metabolite in or on pasture grass, rangeland grass, and grass hay and provide appropriate supporting residue data. It should be noted that any increase in tolerance level is dependent upon toxicological considerations.

24. Data depicting the dicamba residues of concern in or on asparagus spears harvested 1 day following a single postemergence direct spray application of a representative 4 lb/gal SC/L formulation at 0.5 lb ae/A. The tests must be conducted in CA(49%) or WA(35%), since these states accounted for ca. 80% of the 1986 U.S asparagus production (Vegetables, Ag. Statistics Board, NASS, USDA, June 1987, p. 18).

25. A processing study depicting the combined residues of dicamba residues in molasses, refined sugar, bagasse processed from sugarcane bearing measurable, weathered residues. If residues concentrate in refined sugar or bagasse, an appropriate food/feed additive tolerance must be proposed. The established food additive tolerance for sugarcane molasses will be reassessed following evaluation of these data.

26. The adequacy of esteblished tolerances for residues in animal products, the need for additional tolerances, and any requirements for additional data will be determined following receipt of the requested animal metabolism data.

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